



SLOVESNA PODELITEV DIPLOM,
MAGISTRSKIH DIPLOM IN
PROMOCIJA DOKTORJEV ZNANOSTI
UNIVERZE V NOVI GORICI

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Dvorec Lanthieri, 17. junij 2015

Pozdravni nagovor

prof. dr. Danilo Zavrtanik, rektor

Podelitev diplom in magistrskih diplom

Poslovno-tehniške fakultete

prof. dr. Tanja Urbančič, dekanja

Podelitev diplome in magistrske diplome

Fakultete za humanistiko

prof. dr. Katja Mihurko Poniž, dekanja

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Visoke šole za umetnost

prof. Boštjan Potokar, dekan

Promocija doktorjev znanosti

Fakultete za podiplomski študij

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Poslovno-tehniška fakulteta

Visokošolski strokovni študijski program Ekonomika in vodenje proizvodnih in tehnoloških sistemov

- Alan KOMEL; *mentor: pred. Tomica Dumančič,*
Športni trener v funkciji vodenja
- Marko POČKAR; *mentor: prof. dr. Marko Bohanec,*
Prenova nabavno-skladiščnega poslovanja v podjetju za proizvodnjo igrálnih aparatov

Študijski program prve stopnje Gospodarski inženiring

- Biljana KODŽO; *mentor: pred. Tomica Dumančič,*
Fluktuacija in odsotnost z dela v izbrani organizaciji
- Jani GABRIJELČIČ; *mentorja: prof. dr. Urška Lavrenčič Štangar in doc. dr. Henrik Gjerkeš,*
Bioplinski potencial zgornje Vipavske doline
- Petra MARC; *mentor: viš. pred. mag. Armand Faganel,*
Analiza in predlog izboljšav spletne strani izbranega podjetja

Študijski program druge stopnje Gospodarski inženiring

- Matej PREGELJ; *mentor: prof. dr. Milan Bergant,*
Ekonomski izbor energentov za gradnjo enodružinske hiše
- Boštjan SILIČ; *mentor: prof. dr. Iztok Arčon,*
Nadgradnja integracijske sfere za natančne fotometrične meritve na različnih svetilih
- Aleš HUMAR; *mentor: prof. dr. Imre Cikajlo,*
Obvladovanje dobaviteljev in kakovosti materialov v podjetju Letrika
- Daniela MILANOVIČ; *mentor: prof. dr. Marko Bohanec,*
Večkriterijski model za izbiro dobavitelja strateških materialov v livarni
- Uroš ROSA; *mentorica: prof. dr. Tanja Urbančič,*
Ukrepi za zmanjšanje voznega parka podjetja Komunala Nova Gorica z oceno znižanja stroškov in drugih izboljšav
- Nejc BAT; *mentor: prof. dr. Bojan Cestnik,*
Podpora poslovanju malih in srednjih podjetij z računalništvom v oblaku

Fakulteta za humanistiko

Študijski program prve stopnje Kulturna zgodovina

- Martin GARZAROLLI; *mentor: prof. dr. Žarko Lazarevič,*
**Razvoj obrti in industrije v Sežani od konca 2. svetovne vojne do
Londonskega memoranduma o soglasju leta 1954**

Študijski program druge stopnje Slovenistika

- Laura BRATAŠEVEC; *mentorici: doc. dr. Alja Adam in
prof. dr. Katja Mihurko Poniž,*
**Reprezentacije materinstva v izbranih delih slovenske dramatike po
letu 1975**

Visoka šola za umetnost

Študijski program prve stopnje Digitalne umetnosti in prakse

- Miha GODEC; *mentorja: mag. Ana Sluga in mag. Luka Dekleva,*
Naslov teme praktičnega dela: V iskanju sreče
Naslov teme teoretičnega dela: Surfarska fotografija

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- Marko POR; *mentorja: mag. Robert Černelč in doc. dr. Peter Purg,*
Naslov teme praktičnega dela: Misfit's Heart
Naslov teme teoretičnega dela: SPLETNA ZGODBA Optimizacija spletnega animiranega stripa

Študijski program druge stopnje Medijske umetnosti in prakse

- Blaž BERTONCELJ; *mentor: doc. dr. Peter Purg,*
Naslov teme praktičnega dela: Othello - Shakespeare in Tango (multimedijsko okolje predstave)
Naslov teme teoretičnega dela: Integracija novih medijev in tehnologij v plesno uprizoritveno umetnost

Fakulteta za podiplomski študij

Promocija doktorjev znanosti

Študijski program Molekularna genetika in biotehnologija (tretja stopnja)

- Najete SAFINI; *mentor: dr. Sergio G. Tismanitzky,*
Role of autophagy and its enhancing in the clearance of TDP-43 aggregates

Najete Safini iz Moroka je štipendistka ICGEB in je od leta 2011 registrirana na Univerzi v Novi Gorici v sklopu ICGEB doktorskega programa.

Najete je opravila diplomu iz prve in druge stopnje na Univerzi Al Akhawayn ter gostovanje na Univerzi Tor Vergata v Rimu pod mentorstvom prof. Piacentinija, kjer je raziskovala avtofagijo in Ambral.

Ob priključitvi ICGEB-ju se je Najete odločila, da se osredotoči na nevrodegenerativne bolezni, kot so amiotrofična lateralna skleroza (ALS) in frontotemporalna demenca (FTLD). Obe bolezni zaznamuje neravnovesje med proizvodnjo in razgradnjo mutantne oblike TDP-43, ki privede do nastanka znotrajceličnih inkluzij in postopne izgube TDP-43 iz celičnega jedra nevronov. Z namenom boljše razumevanja avtofagije in celične endolizozomske poti je Najete uporabila posebno obliko proteina TDP-43. Ta, tako imenovani EGFP-12xQ/N, združuje EGFP in ponavljajoče se sekvence iz Q/N predela TDP-43, ki močno ojačajo nastanek TDP-43 agregatov. Njeno delo je pokazalo, kako omejnjeni EGFP-12xQ/N citoplazmični agregati povzročajo avtofagijo. Poleg tega, je Najete pokazala, da lahko dekstran sulfat spodbudi avtofagijo in tako pripomore k odstranitvi znotrajceličnih inkluzij. Odstranitev agregatov s pomočjo dekstran sulfata temelji na prisotnosti proteina HDAC.

Rezultati kažejo na to, da dekstran sulfat pomaga celici pri odstranjevanju TDP-43 agregatov, kar lahko predstavlja novo terapevtsko orožje za boj proti podobnim boleznim.

Najete Safini from Morocco is an ICGEB Fellow registered for a degree with ICGEB at the University of Nova Gorica since 2011.

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She did her bachelor degree in biological sciences and her master degree from Al Akhawayn University. She carried out an internship at Tor Vergata University in Rome in Prof. Piacentini's laboratory on autophagy and Ambra1.

Upon joining ICGEB she focused on neurodegenerative diseases, such as Amyotrophic Lateral Sclerosis (ALS) and Frontotemporal Lobar degeneration (FTLD). These diseases are characterized by imbalance between generation and degradation of misfolded TDP-43 protein, resulting in the formation of cytoplasmic inclusions followed by a loss of nuclear TDP-43 in affected neuronal cells. A cell-based TDP-43 aggregation model (EGFP-12xQ/N), that makes use of the fact that tandem repetitions of the Q/N region of TDP-43 linked enhanced green fluorescent protein (EGFP) results in aggregates that are able to sequester either exogenous or endogenous full-length TDP-43, she investigated the autophagy-endolysosomal cell pathway response. The work shows that EGFP-12xQ/N cytoplasmic aggregates induce an autophagy-endolysosomal pathway cell response. Furthermore, it was found that dextran sulfate (DS) treatment enhances inclusions clearance and via an improved autophagic response of the cell. Increase in aggregate clearance is associated with a reduction in sequestration of TDP 43. The mechanism of action of the DS improved clearance was observed to occur through the histone deacetylase-6 (HDAC6).

The data suggests that DS may help the cell to clear TDP-43 aggregates through autophagy revealing a novel therapeutic approach to treat TDP-43 proteinopathies.

- Giulia ROMANO; mentor: dr. Fabian Feiguin,
Characterization of TDP43, an ALS related protein using Drosophila melanogaster model

Giulia Romano je od leta 2006 do 2009 študirala medicinsko biotehnologijo na Univerzi v Trstu.

Doktorat je začela leta 2009 na ICGEB v Trstu pod mentorstvom dr. Fabiana Feiguina, kjer se je osredotočila na karakterizacijo ALS podobnemu proteinu, TDP-43, in za to uporabila vinsko mušico kot model.

Giulia je opazila, da so znotrajcelične spremembe lokalizacije proteina TDP-43 tipične za paciente, ki trpijo za amiotrofično lateralno sklerozo (ALS), s starostjo povezano bolezen motoričnih nevronov. Fiziološka funkcija TDP-43 v živo ter njegovo potencialno delovanje v neurodegenerativnem procesu, ki spremlja ALS ostajajo neznani. Z namenom odgovoriti na to neznanko je Giulia genetsko spremenila vinsko mušico

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in ji onemogočila ekspresijo gena TBHP, homologa človeškega TDP-43. Mušice, ki jim primanjkuje TBHP so imele posledično krajšo življenjsko dobo, resne težave z gibanjem in motnje pri organizaciji sinaps motoričnih nevronov znotraj živčno-mišičnega stičišča. Dodatno je Giulia dokazala tudi kratkotrajno življenjsko dobo proteina TDP-43, ki ga mušice konstantno potrebujejo za regulacijo mobilnosti. Funkcija TDP-43 je, da direktno modulira različne presinaptične molekule, kot so vezikularni protein Syntaxin 1A in Futsch/MAP1B, ki se veže na mikrotubule. Z navedenimi rezultati je tako možno dokazati, da so motnje sinaptične organizacije in predvajanja signala posledica sprememb TDP-43 v živo.

Giulia Romano studied Biotechnologie Mediche at the University of Trieste from 2006 to 2009. She started her PhD at ICGEB-Trieste, Italy in 2009, under the supervision of Dr. Fabian Feiguin and focused her research on the characterization of TDP-43, an ALS related protein using the Drosophila melanogaster as a model.

Giulia observed that alterations in the intracellular distribution of TDP-43 were found in patients suffering from Amyotrophic Lateral Sclerosis (ALS), a late onset disorder that predominantly affects motoneurons. However, the physiological functions of TDP-43 in vivo or its potential role in the neurodegenerative process behind ALS are not known. In order to address these issues, she genetically suppressed the conserved TDP-43 homologous gene in Drosophila (TBPH) and observed that TBPH loss of function alleles in flies presented serious defects in insects' locomotion, dramatic reductions in the life span and structural defects in the organization of motoneuron synapses at the neuromuscular junctions. Moreover, her work demonstrated that TDP-43 is a short-living protein, permanently required in neurons to regulate Drosophila motility and synaptic assembly through the direct modulation of different presynaptic molecules like the vesicular protein Syntaxin1A and the microtubule binding protein Futsch/MAP1B. Indicating that defects in synaptic organization and transmission are early pathological consequences of TDP-43 dysfunction in vivo.

- Maja CIGOJ; mentorja: doc. dr. Maruša Pompe Novak in prof. dr. Paolo Sivilotti, **The impact of grapevine fanleaf virus (GFLV) on quantity and quality parameters of grapevine**

Vinska trta (*Vitis vinifera* L.) je ena izmed najpomembnejših in najbolj razširjenih gojenih rastlin. Tako kot vse druge rastline, je tudi vinska trta izpostavljena vplivom okolja ter

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škodljivcem in boleznim, ki jih povzročajo glive, fitoplazme, bakterije in virusi. Eden izmed ekonomsko najpomembnejših virusov, ki okužujejo vinsko trto, je virus pahljačavosti listov vinske trte (Grapevine fanleaf virus, GFLV), ki povzroča bolezen imenovano kužna izrojenost vinske trte. Maja Cigoj je v svoji doktorski disertaciji preučevala vpliv okužbe z GFLV na količino in kakovost grozdja pri sortah Refošk in Schioppettino s poudarkom na analizah posameznih antocianov v kožici jagod. Že prej je bilo znano, da okužba z GFLV skrajša življenjsko dobo vinograda, Maja Cigoj pa je pokazala tudi zmanjšanje količine pridelka na račun zmanjšanja teže jagod ter povečanje vsebnosti posameznih in skupnih antocianov v grozdju. Študije vsebnosti antocianov je nadgradila s študijami izražanja genov, vključenih v metabolno pot antocianov. Ugotovila je, da ima gen F3H1 pomembno vlogo pri povečanju antocianov v kožicah jagod z GFLV okuženih trsov, medtem ko imata gena F3'H in F3'5'H, pomembno vlogo pri spremienanju razmerja med di- in tri- substituiranimi antociani pod vplivom okužbe z GFLV. Okužba z GFLV je vplivala tudi na kakovost vina, predvsem na količino skupnega ekstrakta, ki se je povečala do 100% in na vsebnost alkohola, ki se je znižala. Vino iz z GFLV okuženega grozdja sorte Schioppettino je prejelo višjo skupno senzorično oceno, vino iz z GFLV okuženega grozdja sorte Refošk pa nižjo skupno senzorično oceno, kot vino iz zdravega grozdja.

Grapevine (Vitis vinifera L.) is one of the most widely cultivated fruit crops and is globally one of the most important fruit species. Due to its wide cultivation, the grapevine is exposed to many abiotic and biotic stresses caused by insects, fungi, bacteria, phytoplasmas and viruses. Grapevine fanleaf disease, caused by Grapevine fanleaf virus (GFLV) is one of the most economically important viral diseases affecting grapevines. In her PhD Thesis, Maja Cigoj investigated the influence of GFLV on agronomically important quantity and quality parameters of grapes of two cultivars, Refošk and Schioppettino with special attention given to analyses of individual anthocyanins in berry skin. She found that besides previously reported reduction of the productive life of vineyards, GFLV infection decreased the yield due to smaller berries and related lower cluster weight, but increased the amounts of all individual anthocyanins and total anthocyanins. The studies of anthocyanin content were complemented with the studies of the expression of genes involved in flavonoid biosynthetic pathway, identifying the F3H1 gene to have an important role in the increase of total anthocyanin content caused by the GFLV infection. The F3'5'H and F3'H genes were shown to have an important role in changing the ratio between tri-substituted and di-substituted

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anthocyanins caused by the GFLV infection. GFLV infection influenced also the quality of the wine, it increased the content of total extract was up to 100 % and decreased the alcohol content. The Schioppettino wine from vines infected with GFLV received higher sensory overall evaluation, while the Refošk wines from vines infected with GFLV got lower overall evaluation as compared to the wine from healthy vines.

- Nina MENCIN; mentorja: prof. dr. Kristina Gruden in dr. Jan Mavri,
***In vitro* selection of DNA aptamers for proteins immobilized on magnetic beads and monitoring of ssDNA pool evolution**

Aptameri so kratki, strukturirani RNK ali DNK oligonukleotidi, ciljno razviti za selektivno prepoznavanje in vezavo izbranih bioloških tarč. Prav zaradi izjemnih vezavnih lastnosti, kot so visoka afiniteta in specifičnost do tarče, se aptameri ponujajo kot odlična alternativa monoklonskim protitelesom v praktično vsaki aplikaciji. Aptameri so izolirani iz ogromnih oligonukleotidnih knjižnic, ki vsebujejo do 10^{15} naključnih zaporedij, s ponavljajočim in vitro selekcijskim postopkom, imenovanim SELEX (sistematičen razvoj ligandov z eksponentno obogatitvijo). Posamezni cikel tega postopka vključuje vezavno reakcijo s tarčo, izolacijo in PCR pomnoževanje izbranih zaporedij ter pripravo novega nabora oligonukleotidov za naslednji cikel. S ponavljanjem tega cikla se diverziteteta začetne knjižnice postopno zmanjšuje, dokler v naboru ne ostanejo le zaporedja z največjo afiniteto do izbrane tarče. Ključni cilj doktorske naloge je bil vzpostaviti platformo za SELEX postopek in razvoj enovijačnih DNK aptamerov za tarčne proteine pripete na magnetne delce, ki omogočajo ločbo aptamerov od nevezanih oligonukleotidov. Za študijski modelni protein smo uporabili streptavidin. Vsak posamezni korak v selekcijskemu postopku smo optimirali, da bi izboljšali njegovo učinkovitost ter izkoristek in s tem naredili postopek enostavnejši, manj zamuden in cenovno ugodnejši. Poleg tega smo preučili različne kvalitativne in kvantitativne metode za spremljanje napredka SELEX-a in potrditev ožanja nabora različnih zaporedij. Rezultate teh metod smo podprli z merjenjem disociacijskih konstant aptamernih naborov in sekvenciranjem. Po uspešni izolaciji streptavidinskih aptamerov smo vzpostavljeni in optimirani SELEX protokol testirali na novi tarči, proteinu Cdc45, ki je zanimiv za raziskave na področju razvoja raka. Ugotovili smo, da SELEX postopek na osnovi magnetnih delcev, na katere je protein pripet preko streptavidin-biotin interakcije, zaradi velikega ozadja ni primeren za izolacijo aptamerov, specifičnih za ta protein.

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Nucleic acid aptamers are small single-stranded DNA or RNA molecules, which fold into well-defined and stable three-dimensional structures for specific recognition and tight binding of any given molecular target. Studies on aptamers emerged rapidly as it had been discovered that they have comparable binding properties as monoclonal antibodies and offer the potential to replace them in most of their application. Aptamers are isolated from huge combinatorial nucleic acid libraries by an in vitro selection process known as systematic evolution of ligands by exponential enrichment (SELEX). During this iterative process of target binding, separation and subsequent PCR amplification of bound sequences, and ssDNA strand purification, the diversity of the oligonucleotide pool decreases until only the sequences with highest binding affinities remain. The main objective of this thesis was to establish a SELEX platform for general ssDNA aptamer production, using magnetic particles for target (protein) immobilization and separation of bound and unbound sequences. Streptavidin was used as a model target. The aim of our work was to better understand SELEX and to optimize each individual step in this process to make it more efficient, user-friendly, inexpensive and fast. Different qualitative and quantitative methods were simultaneously explored to follow-up the progress of selection during SELEX procedure. Data were supported with the calculation of aptamer pool dissociation constants and sequencing analysis. After the successful identification of streptavidin binding aptamers, the proof of concept was tested on new protein target Cdc45, which is interesting for further potential application in the field of cancer research. We have demonstrated that, though well posed in principle, SELEX on magnetic beads using streptavidin-biotin technology for protein immobilization is not applicable for this target, due to the amplification of unspecific, background-binding sequences.

- Danijel STOJKOVIĆ; mentorja: prof. dr. Matjaž Valant in prof. dr. Elsa Fabbretti, **Novel applications of oxygenic photosynthetic organisms**

Po navdihu mikroorganizmov iz narave, ki imajo trdno celično steno za zaščito pred neugodnimi zunanji dejavniki, je v svojem doktoratu Danijel Stojković celice alg *Chlamydomonas reinhardtii* obdali z različnimi materiali. Na ta način je poskušal izdelati biološko anorganske hibride z izboljšanimi lastnostmi, kot je npr. proizvodnja vode-ka. Najprej je celice skušal prekriti s hidriranim silicijevim dioksidom, iz katerega imajo svoje ogrodje diatomejske alge. Z uporabo metode Plast-za-Plastjo, je dobil celice *C. reinhardtii*, ki so bile individualno obdane s silicijevim dioksidom. Žal so celice po en-

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kapsulaciji večinoma umrle, zato smo je odločil za uporabo drugega materiala, da se izognemo toksičnosti uporabljenih spojin. V nadaljnjem je uspešno enkapsulirali celice s TiO_2 . TiO_2 je vplivala na njihove sposobnosti proizvodnje vodika v pogojih brez žvepla. Pri tem je ugotovil, da je inkubacija celic v temi, preden jih izpostavimo svetlobi, nujen pogoj, da se izognemo toksičnim učinkom katalitičnega peptida. S TiO_2 modificirane celice so bile v petih dneh, v primerjavi z nemodificiranimi celicami, sposobne proizvajati H_2 s približno dvakratno učinkovitostjo v primerjavi z neenkapsuliranih celic. Ocena potencialne učinkovitosti za pretvorbo svetlobe v H_2 je pokazala, da bi v optimalnih pogojih bile s TiO_2 oblečene celice *Chlamydomonas reinhardtii*, sposobne preseči vrednost 4 %. Alge je poskušal obdati tudi s platino, kar ga je pripeljalo do odkritja bioredukcijskega potenciala, ki ga imajo celice *C. reinhardtii*. Ugotovil je, da je z uporabo alg mogoče Pt soli reducirati in inducirati usmerjene heterogene nukleacije. Pod ravnimi pogoji brez žvepla so bile alge *Chlamydomonas reinhardtii* sposobne prekriti kozarec s Pt. To je pojav, ki do sedaj še ni bil poznan in je v prihodnje lahko zelo uporaben pri metalizaciji različnih površin.

Inspired by natural microorganisms that possess a rigid cell wall to protect them in harsh conditions, Danijel Stojković in his PhD thesis artificially encapsulated individual cells of Chlamydomonas reinhardtii with different materials and tried to construct biological-inorganic hybrids with enhanced properties like hydrogen production. The first attempt was to cover the cells with hydrated silicon dioxide, which is naturally formed by diatoms. By using a Layer-by-Layer method he obtained individually encapsulated C. reinhardtii cells. Unfortunately the cells were mostly dead after the encapsulation, so he decided to use a different material in order to overcome the problem with cell viability. He successfully encapsulated the cells with TiO_2 using. The encapsulation of C. reinhardtii cells with TiO_2 was found to affect their hydrogen production under sulfur-deprived conditions. He showed that a dark incubation of the cells before exposure to light is essential in order to overcome the toxic effects of the catalytic peptide. The TiO_2 -encapsulated cells were able to produce H_2 with about double efficiency compared to non-encapsulated cells. An estimate potential for the light-to- H_2 conversion efficiency of an optimized system with the TiO_2 -encapsulated Chlamydomonas reinhardtii was found to be more than 4 %. He also tried the encapsulation with platinum, which led to discovery of the bioreductive properties of C. reinhardtii. Beside the homogeneous Pt reduction that he achieved, the most surprising part was the potential to use algae culture for targeted heterogeneous nucleation. Under sulfur

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starvation conditions the Chlamydomonas reinhardtii was able to cover the glass with Pt, which is a phenomena that was previously unknown and can be applied in the future technologies for metallization of different surfaces.

Študijski program

Interkulturni študiji – primerjalni študij idej in kultur

- Sebastjan LEBAN; *mentorica: prof. dr. Marina Gržinić Mauhler*,
Politics of Representation: Capital, Biopower and Art

Doktorska disertacija Politike reprezentacije: Kapital, biooblast in umetnost Sebastjana Lebana razvije analizo razvoja kapitalističnega načina produkcije, ki danes združuje mnogotere sisteme razlastitve. Gre za realnost, ki se od pertinentnih analiz Karla Marxa, Rose Luxembourg in drugih ni spremenila, temveč nadgradila; saj kapital vseskozi izumlja nove načine, s katerimi nas čedalje bolj podreja in veže nase. V globalnem kapitalizmu vidimo radikalno ločitev delavca od produkcijskih sredstev (v smislu vse večje prekarizacije dela), ekspropriacijo produkcijskih sredstev (prek novih oblik kolonialnosti in permanentnega stanja vojne) ter kontrolo delovne sile, ki temelji na razredni, rasni in spolni klasifikaciji, preko katerih kapital strukturira globalno družbeno delitev dela. Čedalje več ljudi je prisiljenih bivati na margini družbenega obstoja, kjer so prek različnih diskriminatornih praks (razrednih, rasnih, verskih, spolnih, etničnih itd.) zvedeni na gola življenja. Biti podrejen in živeti življenje, ki nima politične in družbene vrednosti, danes ni več izjema, ampak je dobesedno postalo pravilo.

Posebno mesto v disertaciji zavzema analiza reprezentacije kapitalističnega načina produkcije, ki se strukturira skozi umetnosti in kulturo. V tem kontekstu disertacija definira dve realnosti, ki sta nadgrajeni med seboj. Prvo lahko spoznamo znotraj oblik reprezentacije kolonialnega subjekta, v kateri zasledimo genealogijo reproduciranja paradigme gospodar/suženj. Drugo pa prek analiz kinematičnega in digitalnega načina produkcije, v kateri se kapital skozi podobe, umetnost in kulturo dobesedno reproducira skozi naša čustva.

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The Doctoral thesis Politics of Representation: Capital, Biopower and Art by Sebastjan Leban provides an analysis of the capitalist mode of production, which today combines multiple ways of dispossession. From the time of pertinent analyzes by Karl Marx, Rosa Luxemburg and others the capitalist mode of production has not changed, but upgraded itself; it invents new means by which it increasingly subordinates and binds us. In global capitalism we see a separation of workers from the means of production (precarization of labor), expropriation of the means of production (through new modes of coloniality, and a permanent state of war) and the control of the labor force through class, race and gender classifications that structure the global social division of labor.

More and more people are forced to live on the margins of social existence, where they are through various discriminatory practices (class, racial, religious, sexual, ethnic, etc.) reduced to bare life. Being subjected and living a life that does not have political and social values, is no longer an exception, but has literally become a contemporary norm.

A special place in the dissertation is given to the analysis of the representation of the capitalist mode of production through arts and culture. In this context, the thesis defines two realities that are superimposed onto each other. The first can be detected through forms of representation of the colonial subject displaying the paradigm of master and slave. The second through the analysis of the cinematic and digital modes of productions where capital through images, art and culture reproduces literally through our affectivity.

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Dvorec Lanthieri, 18. junij 2015

Pozdravni nagovor

prof. dr. Danilo Zavrtanik, rektor

Podelitev diplom Fakultete za znanosti o okolju

prof. dr. Urška Lavrenčič Štangar, dekanja

Podelitev diplome Visoke šole za vinogradništvo in vinarstvo

doc. dr. Branka Mozetič Vodopivec, dekanja

Promocija doktorjev znanosti Fakultete za podiplomski študij

prof. dr. Danilo Zavrtanik, rektor

Fakulteta za znanosti o okolju

Univerzitetni študijski program Okolje

- Tamara ORAŽEM; *mentor: prof. dr. Gregor Drago Zupančič*,
Uporaba UASB reaktorja za anaerobno obdelavo in proizvodnjo bioplina iz papirniške odpadne vode
- Tine ROJ; *mentor: prof. dr. Gregor Drago Zupančič*,
Razvoj spektrofotometrične metode za določanje kemijske potrebe po kisiku (KPK) za vzorce z visoko vsebnostjo trdnih delcev

Študijski program prve stopnje Okolje

- Ana KARAT; *mentor: doc. dr. Andrej Kržan*,
Celovit pristop h kompostiranju biorazgradljivih plastičnih vrečk
- Anja URH; *mentor: doc. dr. Andrej Kržan*,
Vpliv razpada polietilena na vezavo modelnih organskih onesnaževal
- Tatjana RAUH; *mentor: dr. Igor Mihelič*,
Analiza kvalitete različnih vodnih virov na lokaciji mesta Kočevje
- Tjaša LOJPUR; *mentorica: prof. dr. Polonca Trebše*,
Določanje tiametoksama na solati v času karence
- Tamara DOBRAVEC; *mentorica: doc. dr. Barbara Čenčur Curk*,
Oskrba s pitno vodo v Zgornji Bohinjski dolini in na planinskih postojankah, ki jih naselja obsegajo

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- Tina GOVEDNIK; *mentorica: prof. dr. Valentina Turk,*
Metode določanja mikroorganizmov prisotnih v balastnih vodah

Študijski program druge stopnje Okolje

- Mojca MATJAŽIČ; *mentor: doc. dr. Marko Vudrag,*
Azbest – okoljski in zdravstveni problem
- Dušan ALAŠEVIČ; *mentorica: doc. dr. Romina Rodela,*
Interdisciplinarity in environmental research: an analysis of borrowing practices and knowledge integration processes within the Slovene academic community

Visoka šola za vinogradništvo in vinarstvo

Študijski programi prve stopnje Vinogradništvo in vinarstvo

- Martina SOBAN; *mentorja: prof. dr. Paolo Sivilotti in doc. dr. Lorena Butinar,*
Change in yield parameters and grape anthocyanin profile of *Vitis vinifera* L. 'Refošk' as affected by cluster thinning and pre-flowering leaf removal

Fakulteta za podiplomski študij

Promocija doktorjev znanosti

Študijski program Krasoslovje (tretja stopnja)

- Simone MILANOLO; mentorja: prof. dr. Franci Gabrovšek in prof. dr. Frank McDermott,

Sources and transport of inorganic carbon in the unsaturated zone of karst

Kras ima pomembno vlogo v globalnem kroženju ogljika. V vodi raztopljen ogljikov dioksid se porablja za raztapljanje karbonatov, a se pri izločanju sige v kraških jamah, del CO_2 vrne v jamsko okolje in preko "dihanja" kraških jam v zunanje ozračje. Za kvantitativno oceno obsega tega kroženja je kandidat v delu opredelil procese in ovrednotil tokove med različnimi funkcijskimi prostori v vadozni coni krasa na primeru jame Bijambare v BiH. Meritve akumulacije in recesije CO_2 v jamski atmosferi je obravnaval z modelom reaktorja s popolnim mešanjem, s katerim je ocenil dotok ogljikovega dioksida na enoto površine jame. Rezultate regresijskega modela je preveril in potrdil s poskusom enkratnega izpusta 10 kg CO_2 v jamsko okolje. Z vzorčenjem ter kemijsko in izotopsko analizo curkov prenikle vode je ocenil je tok CO_2 , ki vstopa v jamo z razplinjenjem in izločanjem kalcita. Ugotovil je dobro ujemanje z oceno regresijskega modela. Z metodo zaporednega tehtanja je meril hitrost odlaganja kalcita na steklenih ploščicah, ki jih je namestil pod curke prenikle vode in ugotovil neskladje z modelsko oceno, ki temelji na kinetiki izločanja kalcita in predpostavko, da hitrost izločanja pada radialno od mesta dotoka. Problem je rešil z izboljšanim modelom, ki upošteva razpršitev kapljic na mestu dotoka. Idejo je preveril in potrdil tudi z laboratorijskim poskusom. Na koncu je z enostavno ekstrapolacijo ocenjeval pomen "dihanja" kraških jam v globalnem kroženju ogljika in ocenil velikost tega prispevka na 0,3 gigatone ogljika na leto.

Karst areas play an important role in global carbon cycle. Part of CO_2 which is consumed for dissolution of carbonates is degassed during precipitation of calcite in caves and partially returned to the outside atmosphere due to the natural cave ventilation. To quantify this con-

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tribution, the candidate has defined the contributing processes and functional compartments in the vadose zone of Bijambare cave in Bosnia and Herzegovina. Accumulation and regression of CO_2 concentration in the cave atmosphere were monitored and analysed with a model of perfectly mixed reactor. This way a CO_2 flux entering the cave was assessed. The results were verified with an experiment, where 10 kg of CO_2 were artificially released into the main cave chamber. The flux of CO_2 originating from degassing during precipitation of calcite was evaluated by means of chemical analysis of drip water at several locations and a good agreement with the regression model was found. Deposition rates of calcite were measured by successive weighting of glass plates on which the calcite precipitated. To solve the inconsistency between measurements and theoretical predictions, a correction for the drip rate was introduced, which accounts for the part of the drip water by-passing the glass tablet due to drop splashing. The results allow a bit speculative assessment of global CO_2 contribution due to ventilation of caves, which has been estimated at 0.3 GT per year.

Študijski program Fizika (tretja stopnja)

- Katarina MRAMOR; mentor: prof. dr. Božidar Šarler,
Modelling of continuous casting of steel under the influence of electromagnetic field with meshless method

V disertaciji razširimo in raziščemo obnašanje brez mrežne lokalne kolokacijske metode z radialnimi baznimi funkcijami (LRBFCM) za reševanje stacionarnega, laminarnega in turbulentnega toka s strjevanjem pod vplivom statičnega magnetnega polja. Problem določajo sklopljene ohranitvene enačbe za maso, gibalno količino, energijo, koncentracijo, turbulentno kinetično energijo in hitrost disipacije. Strjevanje je modelirano s predpostavko Darcyjevega poroznega medija in vzvodnim mikroizcejnim pravilom. Problem je rešen v dveh dimenzijah z lokalno kolokacijo in muktikvadrličnimi radialnimi baznimi funkcijami na pet točkovnih prekrivajočih se poddomenah, eksplicitno časovno shemo in metodo delnih korakov za popravek tlaka.

Natančnost metode je bila preverjena na več dobro znanih referenčnih testnih primerih kot so gnani tok v kotanji, naravna konvekcija v kotanji pod vplivom zunanjega magnetnega polja, Hartmannov tok ter tok tekočine čez stopnico navzdol z magnetnim poljem. Rezultati so bili preverjeni z analitično rešitvijo, s poprej objavljenimi refe-

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renčnimi rezultati, ter s primerjavo z rezultati izračunanimi s komercialnim programom. Numerični model kontinuiranega ulivanja jekla (temperatura, hitrost, koncentracija) je nadgrajen za uporabo elektromagnetnega zaviranja. Parametrična študija je narejena tako za primere s poenostavljenim, kot tudi z realističnim magnetnim poljem, skupaj z občutljivostno analizo moči, položaja in dosega magnetnega polja. Testi kažejo, da je nadgrajen numerični model uporaben za širok razpon problemov dinamike tekočin vključno s strjevanjem, prenosom sestavin in magnetim poljem, kot tudi to, da lahko z LRBFCM uspešno, natančno in zanesljivo rešujemo enačbe magnetohidrodinamike.

An extension and analysis of the behaviour of a novel Local Radial Basis Function Collocation Method (LRBFCM) meshless method in solution of a steady, laminar, and turbulent solidifying flows, influenced by the static magnetic field has been performed. The problem is defined by coupled mass, momentum, energy, species, turbulent kinetic energy, and dissipation rate equations. Solidification is modelled by Darcy porous media assumption and lever microsegregation rule. It is solved in two dimensions by local collocation with multiquadric radial basis functions on five noded overlapping sub-domains, explicit time-stepping, and fractional step pressure correction.

The accuracy of the method has been tested on several well known benchmark tests, such as the lid-driven cavity, natural convection in a square cavity under the influence of externally applied magnetic field, Hartmann flow and backward facing step with magnetic field. The results have been verified against analytical solutions, previously published results, and by comparison with results of commercial software.

The numerical model for continuous casting of steel (temperature, velocity, concentration) is upgraded for the application of electromagnetic breaking. The parametric study is performed for both the simplified and the realistic magnetic fields along with a sensitivity analysis of magnetic field strength, position, and range. The tests show, that the upgraded numerical model is applicable on a wide range of fluid flow problems, including solidification, species transfer and magnetic field, as well as that the LRBFCM is able to successfully, accurately, and reliably solve the magnetohydrodynamic equations.

- Umüt HANOGLU; mentor: prof. dr. Božidar Šarler,
Simulation of Hot Shape Rolling of Steel by a Meshless Method

Razvit je bil simulacijski sistem za vroče oblikovno valjanje v kontinuirnem tipu valjarne.

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Izračunana so temperaturna, deformacijska in napetostna polja valjanca v odvisnosti od procesnih parametrov. Izračuni so narejeni na podlagi modela potujoče rezine. Rešitveni postopek za tovrstni termomehanski model temelji na novi lokalni kolokacijski metodi z radialnimi baznimi funkcijami. Simulacija vsebuje tri poglobitve dele: termični model, mehanski model in model za postavljanje in prestavljanje računskih točk na podlagi eliptičnega generatorja točk. Termični model je rešen na podlagi eksplicitne sheme. Velike deformacije v mehanskem modelu so obravnavane na podlagi sosednjih majhnih deformacijskih korakov. Multikvadrčne funkcije so uporabljene kot oblikovne funkcije na pet ali sedem-točkovnih poddomenah. Pred uporabo modela v vročem valjanju je bil ta natančno preizkušen na enajstih testnih primerih. Dvo dimenzionalna geometrija vtikov za izračun deformacije valjanca je izračunana na podlagi položaja v smeri valjanja ter geometrijskih podatkov valjčnice. V demonstracijski simulaciji upoštevamo valjarno podjetja Štore Steel, ki jo sestavlja pet orodij z različnimi geometrijami vertikalnih in horizontalnih vtikov. Demonstriramo vroče valjanje vzmetnega jekla 16MnCrS5 iz pravokotne oblike v okroglo palico. Simulacija celotne valjarske proge je bila prvič narajena na podlagi brez mrežne metode, ki ima številne prednosti pred klasičnimi numeričnimi pristopi.

A simulation system for hot shape rolling of steel is developed for a continuous type of rolling mill. The temperature, strain and stress fields in the strand are calculated as a function of process parameters. The calculations are made based on a travelling slice model assumption. The solution procedure for a related thermo-mechanical problem is based on a novel local radial basis function collocation method. The simulation incorporates three major parts: the thermal model, the mechanical model and the setting and repositioning of the nodes by elliptic node generation. Explicit time stepping is used for solving the thermal model. Large deformation in the mechanical model is coped with successive small deformation steps. Multiquadric radial basis functions are used as shape functions on five or seven-nodded overlapping influence domains. The model has been tested in detail for eleven test cases before applying it to a rolling simulation. The corresponding two-dimensional groove geometry for deformation of the strand is calculated as a function of position in the rolling direction and roll geometry parameters. In the demonstrational simulation, a rolling mill from Štore Steel is considered, which consists of five rolling stands with different vertical and horizontal groove geometries. The hot rolling of 16MnCrS5 steel grade from rectangular to circular rod shape is demonstrated. For the first time, a simulation of a whole rolling schedule is done by a meshless method which possesses several advantages over classical numerical methods.

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Študijski program Znanosti o okolju (tretja stopnja)

- Ambra DELNERI; *mentor: prof. dr. Mladen Franko*,
Novel methods for the detection and removal of cyanobacteria and cyanotoxins

Disertacija Ambre Delneri se osredotoča na razvoj novih metod za detekcijo cianopigmentov in mikrocistina-LR - najbolj nevarnega doslej poznane cianotoksina - ter njegovo odstranjevanje iz sladkih vod. Cvetenje cianobakterij, pri katerem se tovrstni toksini lahko sproščajo v velikih količinah, predstavlja nevarnost za okolje in zdravje ljudi. Zato je svetovna zdravstvena organizacija priporočila mejno koncentracijo mikrocistina-LR 1 µg/L v pitni vodi in skupaj z drugimi javnimi agencijami v različnih državah, močno priporoča razvoj sistemov za zgodnje odkrivanje cianobakterij in cianotoksinov ter njihovo odstranjevanje.

Pri svojem delu je Ambra Delneri kot detekcijsko tehniko uporabila visoko občutljivo spektrometrijo na toplotne leče – TLS. Mikrocistin-LR (MC-LR) je poskusila detektirati preko inhibicije encima proteinska fosfataza PP2A, oziroma ugotavljati prisotnost MC-LR s sistemom za zgodnje odkrivanje toksinov preko detekcije cianopigmentov. Pri tem je kot najbolj učinkovito potrdila detekcijo pigmenta Cr-fikoeritrina, za katerega je s kombinacijo TLS in pretočne injekcijske analize-FIA dosegla spodnjo mejo detekcije 13 µg/L, ki že omogoča opozarjanje pred nevarnimi koncentracijami MC-LR (1 µg/L ali več). Uspešna je bila tudi pri detekciji MC-LR s kombinacijo TLS in FIA ter meritve aktivnosti PP2A, ki jo inhibira MC-LR. Z opisano metodo je dosegla spodnjo mejo detekcije 0,64 µg/L, ki je nižja od dopustne koncentracije za MC-LR v pitni vodi.

V zaključnem delu disertacije je razvila metodo za odstranjevanje MC-LR iz vode, ki temelji na adsorpciji toksina na novem kompozitnem materialu iz hitosana in celuloze. Pokazala je, da je en gram tovrstnega materiala sposoben vezati 96 mg mikrocistina. To je 4,8-krat več od najbolj učinkovitega materiala poznane doslej. Poleg visoke adsorpcijske sposobnosti so materiali na osnovi celuloze in hitosana okolju bolj prijazni, saj sta osnovni sestavini biokompatibilni in biorazgradljivi, sinteza pa poteka z uporabo ionskih tekočin, ki jih po izpiranju z materiala lahko recikliramo z destilacijo.

Dissertation of Ambra Delneri focuses on the development of novel methods for the detection of cyanopigments and for the detection and removal of microcystin-LR (MC-LR) from freshwa-

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ter. The health's risk associated to cyanotoxins lead the World Health Organization (WHO) to set provisional guidelines for the presence of MC-LR – so far, the most harmful cyanotoxin known - in drinking and recreational waters at 1 µg/L. WHO and other public agencies in different countries strongly recommend further studies on cyanobacteria, cyanotoxins and on the development of early warning detection and removal systems of cyanobacteria and cyanotoxins. In the first part of her Dissertation highly sensitive thermal lens spectrometry (TLS) was applied for detection of cyanopigments such as Cr-phycoerythrin (Cr-PE). She achieved a limit of detection (LOD) for Cr-PE at 13 µg/L by coupling TLS with flow injection analysis (FIA). This compares favorably with concentration of Cr-PE, which corresponds to the presence of 1 µg/L of MC-LR in water as calculated for the maximum possible content of phycoerythrin in cyanobacteria, and amount of cyanobacteria needed to generate the same amount of toxin. In addition, Ambra Delneri developed a detection system for MC-LR based on FIA-TLS and the inhibition assay of protein phosphatase. The LOD achieved with this system was 0.64 µg/L, which is lower than the limit set for drinking water.

In the final part of Dissertation a method for the removal of MC-LR based on the adsorption on chitosan-cellulose novel composite materials was investigated. The maximum adsorption efficiency of these materials was 96 mg per gram of adsorbent material. This is 4.8 times higher than on the best previously known adsorbers for MC-LR. Besides the high adsorption efficiency, these composite materials have the advantage of being biocompatible and biodegradable. Moreover, ionic liquid that is used to prepare them can be washed away and recycled by distillation.

- Vesna LAVTIŽAR; mentorja: prof. dr. Polonca Trebše in dr. ir. Cornelis A.M. van Gestel,

Environmental stability and toxicity assessment of chlorantraniliprole and its derivatives

V disertaciji se je Vesna Lavtižar osredotočila na stabilnost novo razvitega insekticida klorantraniliprola v vodi in njegovo strupenost na izbrane netarčne nevretenčarske organizme. Raziskava stabilnosti v medijih z različnimi pH vrednostmi je pokazala, da CAP ni stabilen v bazičnih raztopinah in se razgradi v en specifičen razgradni produkt. Ugotovila je tudi, da se CAP v prisotnosti svetlobe razgrajuje in tvori tri nove produkte, ki jih je identificirala in okarakterizirala. Pokazala je, da se ti razgradni produkti tvorijo

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različno glede na lastnosti medija. Strupenostni testi so pokazali, da je CAP zelo strupen za vodno bolho *Daphnia magna*, nobenega strupenostnega učinka ni bilo opaženega pri njihovem razmnoževanju. CAP se je izkazal kot zelo strupen tudi za skakače *Folsomia candida*. Študija strupenosti CAPa na skakače *F. candida* v zemlji z različnimi vsebnostmi organske snovi je pokazala, da ima CAP manjši strupenostni učinek v zemlji z večjim odstotkom organske snovi. Test izogibanja s skakači *F. candida* pa nakazuje, da CAP vpliva na gibalne sposobnosti izpostavljenih živali na zelo hiter način. Strupenostnih učinkov CAPa na preživetje in razmnoževanje nekaterih drugih testnih organizmov, kot so črvi, oribatidne pršice in bentični črvi, tudi ob izpostavljenosti zelo visokim koncentracijam CAPa ni zaznali.

Vesna Lavtižar je del raziskovalnega dela opravila na Nizozemskem, rezultati njenega dela pa so objavljeni v dveh znanstvenih člankih v mednarodnih revijah s faktorjem vpliva, in sicer v *Chemosphere* ter *Environmental Science and Technology* z IF več kot 5, kar potrjuje kakovost njene disertacije.

*The dissertation of Vesna Lavtižar is focused on the stability of the newly developed insecticide chlorantraniliprole in water and its toxicity on selected non-target invertebrate organisms. The study of stability in the media with different pH values indicated that CAP is not stable in basic solutions and decomposes to the specific degradation product. It was also found that the CAP in the presence of light degrades and forms three new products, which she identified and characterized. She showed that these degradation products are formed differently depending on the properties of the medium. Toxicity tests have demonstrated that the CAP is very toxic to water flies *Daphnia magna*, but no toxic effect was found on their reproduction. CAP has proven to be very toxic for springtail *Folsomia candida*. A toxicity assessment study on *F. candida* using soils with different organic matter contents revealed that CAP is less toxic in high organic soils compared to the low organic soils. An avoidance test with *F. candida* suggests that CAP is affecting the animals in a very prompt way, making their locomotive ability to dysfunction. CAP was not toxic to the survival and reproduction of the enchytraeids, the oribatid mites and the benthic worms, as well as on the survival, consumption rate and body mass of the isopods even at the very high CAP concentrations. Vesna Lavtižar carried out a part of her research work in the Netherlands. The results of her work are published in two scientific papers in international journals with impact factor, one in *Chemosphere* and another in *Environmental Science and Technology* with the IF more than 5, which confirms the quality of the dissertation.*

Študijski program Znanosti o okolju

- Romana KRIŠTOF; *mentorici: dr. Jasmina Kožar Logar in dr. Cristina Otero Hernández,*
Quantification of biocomponents in fuels by ^{14}C

Biogoriva štejejo med obnovljive vire energije. Nihova uporaba pomeni zmanjšanje porasta toplogrednih plinov v ozračju, zato Evropska skupnost vzpodbuja njihovo proizvodnjo in uporabo. Poleg stimulativnih ekonomskih ukrepov potrebujemo tudi učinkovit nadzor nad kvaliteto in kvantiteto biokomponent v gorivih.

Zaradi velikega števila različnih biokomponent obstaja veliko specifičnih metod za njihovo ugotavljanje. Katero uporabiti pri neznanu mešanici goriv? Zaželjena je seveda natančna, točna, zanesljiva, hitra in poceni metoda, ki bi bila uporabna za različne biokomponente. In prav to ponuja Romana Krištof v svojem doktorskem delu.

Ko je začela s svojim raziskovalnim delom, si je Romana Krištof s skupino na Institutu "Jožef Stefan" postavila naslednje vprašanje: "Ali lahko radiokemijsko metodo za datiranje z radioaktivnim izotopom ogljika uporabimo tudi za ugotavljanje vsebnosti biokomponent v gorivih?"

Osnovna ideja je bila torej preprosta: v ozračju in vseh živih bitjih so trije izotopi ogljika v znanem razmerju. S smrtjo organizma se izmenjava ogljika z okolico ustavi, razmerje med izotopi se začne spreminjati, saj radioaktiven C-14 razpada. Vsebnost C-14 torej lahko uporabimo kot uro – manj kot ga je, starejši je na primer les v barjanskem kolesu. V fosilnem gorivu ni več izotopa C-14, medtem ko ga je v biokomponenti toliko kot v današnjem ozračju. Romana Krištof je postopek za goriva priredila tako, da vzorca pred analizo ni potrebno razgraditi na osnovne gradnike, kot je to v navadi pri običajnem datiranju. Metodo je preiskovala na dejanskih vzorcih dizlov, bencinov in etanolov, ki so na voljo na slovenskem trgu, in na raznovrstnih biokomponentah, od katerih jih je devet skupaj s sodelavci izdelala na Institutu za katalizo in petrokemijo v Madridu.

Kratek odgovor na prvotno vprašanje, ali je radiokemijsko metodo za datiranje z radioaktivnim izotopom ogljika možno uporabiti tudi za ugotavljanje vsebnosti biokomponent v gorivih, je torej DA, nekoliko daljši odgovor pa je zaradi obravnave raznovrstnosti in pestrosti biogoriv z vsemi posebnostmi vreden doktorskega naziva.

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Biofuels are considered a renewable energy source. Their use leads to a reduction of greenhouse gases in the atmosphere; therefore the European Union encourages their production and use. In addition to the economic measures, effective control of the quality and quantity of biocomponents in fuels is also needed. Numerous different biocomponents exist, which results in a high number of specific methods for their determination. Which should be used for unknown fuel blend? It would be of utmost importance to have a precise, accurate, reliable, rapid and inexpensive method that could be used for a variety of biocomponents. Romana Krištof offers exactly this in her doctoral thesis.

In the initial stage of her research work, she, together with the group at the Jožef Stefan Institute, posed the following question: »Is the radiocarbon dating method suitable also for the determination of the biocomponent content in fuels?»

The basic idea was actually very simple: in the atmosphere and all biota there are three isotopes of carbon in the known ratios. Upon the death of an organism, its carbon exchange with the surrounding environment stops, and the ratio between isotopes starts to change because of the radioactive decay of C-14. The content of C-14 can therefore be used as a clock – the lesser quantity of it exists, the older the organic matter of the interest, for example the wooden wheel from Ljubljana's Marsh (Ljubljansko barje), is. In the fossil fuel, there is no C-14 while the recent bio component contains as much C-14 as the atmosphere does. Romana Krištof modified the dating procedure to such an extent that the usual chemical sample treatment was omitted. The method was tested on real samples of diesel, petrol and ethanol available on Slovenian market as well as on nine bio components which were produced by her and her co-workers at the Institute of Catalysis and Petrochemistry in Madrid. The short answer to the initial question whether the radiocarbon dating method is also suitable for the determination of the biocomponent content in fuels, is therefore YES. The rather longer answer is worth of a doctoral title due to the study of the diversity and variety of biofuels, with all their special features.

