

CHAIN EXTENSION OF CAPROLACTONE AND ETHYLENE GLYCOL MACRODIOLS INTO HYDROXY-TERMINATED POLYURETHANES

S. Mačiulytė^{1*}, J. Bėkiš², A. Strakšys¹, S. J. Asadauskas¹

¹ Center of Physical Sciences and Technology, Saulėtekio av. 3, LT-10257 Vilnius, Lithuania;

² Dept. of Polymer Chemistry, Vilnius University, Naugarduko St. 24, LT-03225 Vilnius;

*E-mail: sandra.maciulyte@ftmc.lt

Polyurethane (PU) plastics are widespread in various areas such as adhesives, coatings, synthetic leather, etc. [1]. Frequently, PU plastics are synthesized from two components: 1) macrodiols and 2) isocyanates, whose reactions form urethane linkages [2]. The macrodiol must contain two OH groups with a polyether, polyester, hydrocarbon, polycarbonate or other type of spacer chain in between. Quite often, the macrodiol is pre-reacted with diisocyanates for chain extension and only then cross-linked into the final PU plastic. Resulting properties also depend on molecular weights, degree of crystallinity and morphology of PU polymers [3] in addition to the consequences of many side reactions, such as CO₂ evolution.

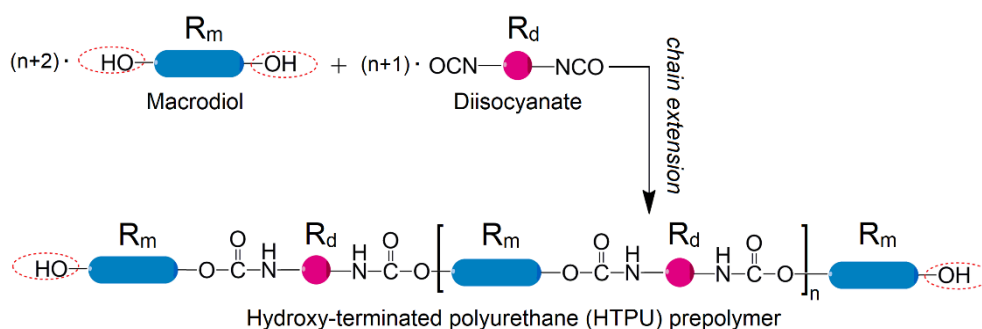


Fig.1. Synthesis scheme of HTPU prepolymers. R_m = PCL or PEG and R_d = TDI or HDI. Spacers not to scale.

The aim of this study was to synthesize a hydroxy-terminated PU (HTPU) prepolymer that can be further used as an OH-component for two-component PU adhesives. The HTPU prepolymers were prepared by solvent-less polyaddition of macrodiols and diisocyanates. Polycaprolactone (PCL) adduct with ethylene glycol ($M_n=2000$ g/mol) or polyethylene glycols (PEG) of $M_n=1000$ or 2000 g/mol were used as macrodiols. Diisocyanates of 1,6-hexamethylene (HDI) or 2,4-toluene (TDI) were employed for chain extension, Fig. 1. The reaction temperature was selected at 50°C or 80°C with molar ratio of macrodiol : diisocyanate at 1:0.5 or 1:0.3. Chain extension progress was investigated by FTIR and titrimetry, measuring the NCO group concentration. Viscosity, chemical and thermal properties of the obtained prepolymers were analysed using vibrational viscometry, FTIR, DSC and other methods. HTPU viscosities increased with decreasing isocyanate groups until their final depletion. HTPU prepolymers, which were synthesized from PCL, showed higher viscosity, compared to those from PEG. They might constitute an OH-component, which could be crosslinked into PU adhesives or plastics for other applications.

Acknowledgment

This study was carried out under project TERMINUS, funded by the European Union under Horizon 2020. Call: H2020-NMBP-ST-IND-2018. Grant Agreement: 814400.

References

1. B. N. Rao, P. J. P. Yadav, K. Malkappa, T. Jana., *Polymer*, **77** (2015) 323-333.
2. N. Akram, K. M. Zia, R. Sattar, S. Tabassum, M. Saeed, *J. Appl. Polym. Sci.*, **136** (2019) 47289.
3. E. Ozsagiroglu, B. Iyisan, Y. A. Guvenihir, *Pol. J. Environ. Stud.*, **21** (6) (2012) 1777-1782.





CENTER
FOR PHYSICAL SCIENCES
AND TECHNOLOGY

Lithuanian chemists conference



Chemistry & Chemical Technology

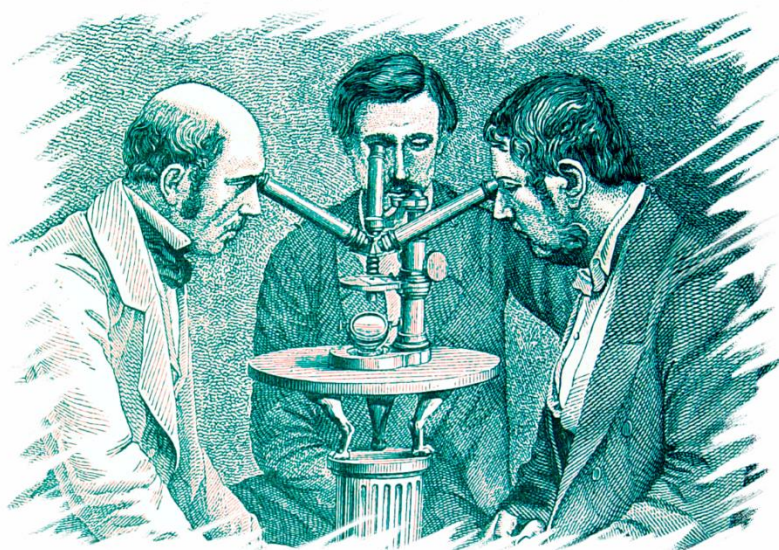


Vilnius University Press



CTT-2019

CONFERENCE BOOK



*Join to the frontiers
of science in*

**2019 May 16 | 8 AM to 16 PM |
LITHUANIAN ACADEMY OF SCIENCES
VILNIUS**

WELCOME

THE AIM OF THE CONFERENCE IS TO BRING TOGETHER YOUNG SCIENTISTS, ENGINEERS, RESEARCHERS AND STUDENTS OF LITHUANIAN UNIVERSITIES, INSTITUTES, CENTERS OF SCIENCE AND BUSINESS TO CARRY OUT RESEARCH IN THE FIELD OF CHEMISTRY AND CHEMICAL TECHNOLOGY, TO PROVIDE THE OPPORTUNITY TO EXPAND KNOWLEDGE AND PRESENT THE LATEST SCIENTIFIC RESULTS AND IDEAS.

TABLE OF CONTENTS

| | |
|---|------------|
| Organizing and scientific committees, sponsors | 2 |
| Conference Program | 3 |
| Invited speakers | 12 |
| Information about the authors | 12 |
| Abstracts of invited speakers..... | 15 |
| General session | 21 |
| Oral presentations | 21 |
| Poster presentations..... | 29 |
| Index of authors..... | 136 |

Chemistry & chemical technology
Lithuanian chemists conference

ISBN/ISMN 978-609-07-0167-6

© Vilnius University, 2019

Organizing and scientific committees, sponsors

Scientific Conference Committee:

Prof. habil. dr. Almira Ramanavičienė / Vilnius VU
Prof. habil. dr. Aldona Beganskienė / Vilnius VU
Prof. habil. dr. Aivaras Kareiva / Vilnius VU
Prof. dr. Eugenijus Valatka / Kaunas KTU
Prof. dr. Kęstutis Baltakys / Kaunas KTU
Prof. habil. dr. Juozas Vidas Gražulevičius / Kaunas KTU
Prof. habil. dr. Rimantas Ramanauskas / Vilnius CPST
Dr. Svajus Asadauskas / Vilnius CPST
Dr. Asta Kaušaitė-Minkštimienė / Vilnius VU
Dr. Lina Mikoliunaitė / Vilnius VU

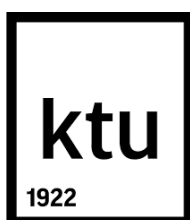
Organizers:

Prof. habil. dr. Arunas Ramanavičius (chairman)
Prof. habil. dr. Almira Ramanavičienė
Dr. Linas Vilčiauskas
Dr. Lina Mikoliunaitė (secretary)
Dr. Justina Gaidukevič
Dr. Jūratė Jonikaitė-Švegždienė
Dr. Ieva Karpavičienė
PhD student Julija Grigorjevaitė
Master's student Greta Inkrataitė
Master's student Liudas Daumantas

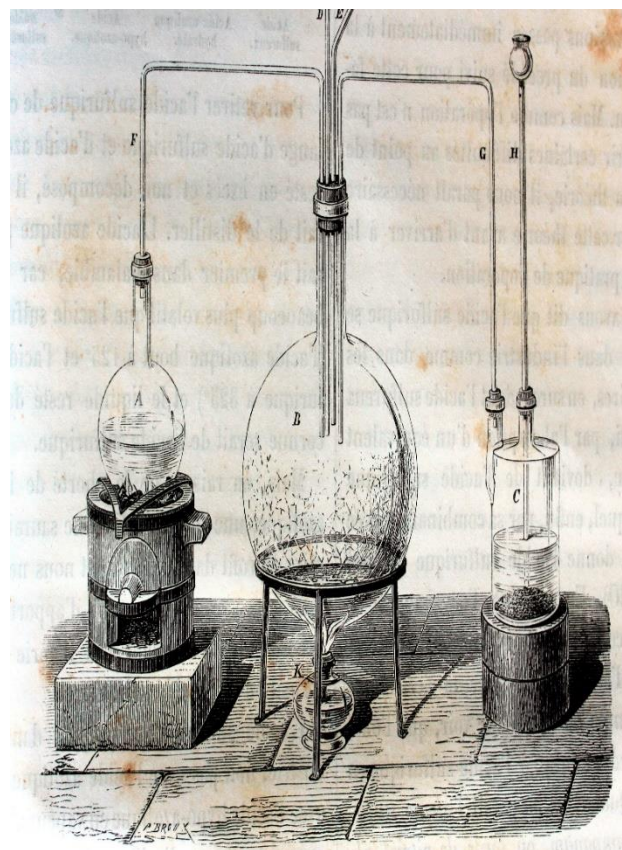
Sponsors:



Lietuvos
mokslo
taryba



CENTER
FOR PHYSICAL SCIENCES
AND TECHNOLOGY



Conference Program

16th May

Venue: Lithuanian Academy of Sciences, Gedimino av. 3, Vilnius

| Time | Presenter | Institution | Title of the Lecture |
|---------------|--|--|---|
| 8:00 – 9:00 | Registration of participants | | |
| 9:00 – 9:10 | Welcome speech of Vilnius University Rector Prof. A. Zukauskas | | |
| 9:10 – 9:15 | Welcome speech of Vilnius University Faculty of Chemistry and Geosciences Dean Prof. A. Beganskiene | | |
| 9:15 – 9:45 | Invited Speaker prof. dr. Fabio Marchetti | University of Camerino, Italy | Novel composite materials for antimicrobial applications |
| 9:45 – 10:15 | Invited Speaker prof. dr. Zineb Mekhalif | Namur University, Belgium | Electrochemistry and Surface Chemistry: a powerful combination for nanotechnology |
| 10:15 – 10:45 | Invited Speaker prof. dr. Ismail Hakki Boyaci | Hacettepe University, Ankara, Turkey | Raman and SERS-based detection of Gene and Microorganisms |
| 10:45 – 11:45 | Poster session I and coffee break | | |
| 11:45 – 12:15 | Invited Speaker dr. Magdalena Oćwieja | Polish Academy of Sciences, Krakow, Poland | Noble metal nanoparticle layers of tunable coverage, structure and charge |
| 12:15 – 12:45 | Invited Speaker prof. dr. Sheng-Tung Huang | National Taipei University of Technology, Taiwan | Design strategies and applications of self-immolative chemical probes for biosensing |
| 12:45 – 13:45 | Lunch Break (free time) | | |
| 13:45 – 14:00 | Tadas Matijošius | Center for Physical Sciences and Technology, Lithuania | Penetration of titanium into alumina nanopores after atomic layer deposition or magnetron sputtering |
| 14:00 – 14:15 | Prof. dr. Aušra Valiūnienė | Vilnius University, Lithuania | Fast Fourier transform electrochemical impedance spectroscopy for monitoring surface modification |
| 14:15 – 14:30 | Aušra Adomėnienė | Kaunas University of Technology, Lithuania | Enzyme inhibitory activity of hydroethanolic extract of yam (<i>dioscorea caucasica</i> lipsky) leaves |

| | | | |
|---------------|--|---|---|
| 14:30 – 15:00 | Coffee break | | |
| 15:00 – 15:15 | Lijana Dienaitė | Kaunas University of Technology, Lithuania | Antioxidant capacity and phytochemical composition of guelder-rose berry pomace extracts |
| 15:15 – 15:30 | Prof. dr. Artūras Katelnikovas | Vilnius University, Lithuania | Rare Earth Elements: Industrial Applications |
| 15:30 – 15:45 | Dobrochna Rabie | Nicolaus Copernicus University in Toruń, Poland | Determination of storage conditions of refined rapeseed oil fortified with phenolic acid esters |
| 15:45 – 16:00 | Dr. Alanas Petrauskas | Aukštieji algoritmai | It's not what we know – it's how we think! |
| 16:00 – 17:00 | Poster session II | | |
| 17:00 – 17:15 | The Best Posters Awards and Conference Closing Ceremony | | |
| 18:00 – 20:00 | Conference Gala dinner | | |

POSTER SESSION I

10:45 – 11:45

Inorganic chemistry

| | | |
|------------|--|--|
| P01 | <u>R. Aukštakojytė</u> , J. Gaidukevič, J. Barkauskas | MALONIC ACID ASSISTED REDUCTION OF GRAPHITE OXIDE: STRUCTURAL CHARACTERISATION |
| P02 | <u>K. Baltakys</u> , G. Sarapajevaite, V. Rudelis | WAYS OF SULFUR WASTE RE-USE UNDER HYDROTHERMAL CONDITIONS |
| P03 | <u>M. Baublytė</u> , M. Liubiniene, A. Beganskiene | HYDROGEL AND ENZYMES COMBINATION FOR PAPER DOCUMENTS CLEANING |
| P04 | <u>A. Bronušienė</u> , I. Ancutienė | XRD STUDY OF THIN SnS FILMS ON FTO GLASS |
| P05 | <u>I. Grigoraviciute-Puroniene</u> , V. Vegelyte, A. Kareiva | SYNTHESIS OF LOW CRYSTALLINE CALCIUM DEFICIENT HYDROXYAPATITE GRANULES |
| P06 | <u>G. Inkrataitė</u> , A. Popov, R. Skaudžius | PREPARATION AND CHARACTERIZATION OF LUAG AND YAG BASED SCINTILLATION MATERIALS |
| P07 | <u>M. M. Kaba</u> , A. Smalenskaite, I. Morkan, A. Kareiva | ON THE WET CHEMISTRY PREPARATION OF LAYERED DOUBLE HYDROXIDE AND MIXES-METAL OXIDE COATINGS |
| P08 | <u>D. Karoblis</u> , A. Zarkov, A. Kareiva | SYNTHESIS OF (1-x)BaTiO ₃ ·xBiMnO ₃ SOLID SOLUTIONS VIA SOL-GEL METHOD |
| P09 | <u>N. Kybartienė</u> , G. Urbonavičiūtė | INFLUENCE OF CALCINED CLAY ON THE EARLY HYDRATION OF ANHYDRITE BINDING MATERIAL |
| P10 | <u>I. Knabikaitė</u> , K. Baltakys, T. Dambrauskas, A. Eisinis | THE INFLUENCE OF COBALT IONS ON COMPOUNDS FORMATION PROCESS IN CaO-SiO ₂ -Al ₂ O ₃ -H ₂ O SYSTEM |

| | | |
|--------------------------|---|--|
| P11 | <u>A.Kunciute</u> , R.Ivanauskas, A.Ivanauskas | COPPER-DOPED TIN(II) SELENIDE THIN FILMS |
| P12 | I. Lebedyte, <u>I.Mikalauskaite</u> , G. Plečkaityte, A. Beganskiene, A. Kareiva | UPCONVERSION LANTHANIDE-DOPED NaYF ₄ NANOCRYSTALS COATED WITH SILICA SHELL |
| P13 | <u>I. Mikalauskaitė</u> , G. Plečkaitytė, K. Paulauskaitė, A. Beganskienė | CONTROLLING UPCONVERSION EMISSION OUTCOME IN Yb ³⁺ /Er ³⁺ SYSTEMS |
| P14 | <u>M. Misevicius</u> | LUMINESCENCE OF Eu(II) DOPED AND Dy(III) CODOPED SrAl ₄ O ₇ |
| P15 | <u>D. Monstvilaite</u> , R. Kaminskas | INFLUENCE OF CALCINED MICA CLAY ON SULFATE ATTACK OF CEMENT STONE |
| P16 | <u>M. Norkus</u> , J.Aglinskaitė, A.Katelnikovas, P.Vitta, R. Skaudžius | ONE-STEP PHOSPHOR IN GLASS SYNTHESIS AND CHARACTERIZATION |
| P17 | <u>A. Pakalniškis</u> , R. Skaudžius | GdPO ₄ /Eu/Yb-Tm BASED PHOSPHOR SYNTHESIS AND ANALYSIS |
| P18 | <u>E. Prichockiene</u> , R. Siauciunas | CARBONATION OF α-C2SH AND ITS CALCINATION PRODUCTS |
| P19 | <u>G. Rimkutė</u> , J. Gaidukevič, V. Gurevičienė, J. Razumienė, I. Šakinytė | SYNTHESIS OF THERMALLY REDUCED GRAPHENE OXIDE AND ITS APPLICATION FOR UREA BIOSENSOR WITH IMPROVED LONG-TERM STABILITY |
| P20 | <u>D. Rubinaitė</u> , T. Dambrauskas, K. Baltakys | THE SYNTHESIS OF BELITE–CALCIUM SULFOALUMINATE CEMENT AND ITS PROPERTIES |
| P21 | <u>L. Sinusaite</u> , I. Grigoraviciute-Puroniene, A. Popov, A. Kareiva, A. Zarkov | CONTROLLABLE SYNTHESIS OF TRICALCIUM PHOSPHATE (TCP) POLYMORPHS BY WET PRECIPITATION: EFFECT OF WASHING PROCEDURE |
| P22 | <u>G. Smalakys</u> , R. Šiaučiūnas | THE IMPACT OF RAW MEAL COMPOSITION ON LOW- BASE CALCIUM SILICATE HYDRATES SYNTHESIS |
| P23 | <u>A. Šmigelskytė</u> , Ž. Takulinskas, J. Skirbutas | INFLUENCE OF RAW MEAL COMPOSITION ON SINTERING AND CARBONATION OF CALCIUM SILICATES |
| P24 | <u>V. Valančienė</u> , J. Rugevičiūtė | GRANITE DUST – NON-PLASTIC AND FLUXING ADDITIVE FOR BUILDING CERAMICS |
| P25 | <u>L. Valeikiene</u> , R. Paitian, I. Grigoraviciute-Puroniene, A. Kareiva | SOL-GEL SYNTHESIS OF MG(X)/AL (X = MN, CO, NI, CU, ZN) LAYERED DOUBLE HYDROXIDES |
| P26 | <u>N. Žmuidzinašienė</u> , A. Šulčius, E. Griškoniš | CORROSION OF ELECTROLYTIC MANGANESE COATINGS IN 3% NaCl SOLUTION |
| Organic chemistry | | |
| P27 | <u>A. Akmanov</u> , D. Gudeika | ROOM TEMPERATURE PHOSPHORESCENCE OF THIANTHRENE COMPOUNDS |
| P28 | <u>B.Balandis</u> , K.Anusevičius, B. Sapijanskaitė, V.Mickevičius | SYNTHESIS OF NOVEL 1,3-DISUBSTITUTED 5- OXOPYRROLIDINES |
| P29 | S. Grigalevicius, D. Tavgeniene, <u>D. Blazevicius</u> , B. Zhang, S. Sutkuvienė | BIPOLAR PHENOXAZINE-BASED COMPOUNDS AS NEW HOST MATERIALS FOR GREEN PHOSPHORESCENT OLEDs |

| | | |
|------------|--|--|
| P30 | <u>T Braukyla</u> , R. Xia, M. Daškevičienė, T. Malinauskas, A. Gruodis, V. Jankauskas, C. Roldán-Carmona, C. Momblona, V. Getautis, M. K. Nazeeruddin | HOLE-TRANSPORTING MATERIALS FOR PEROVSKYTE SOLAR CELLS CONTAINING TRÖGER'S BASE CORE AND ENAMINE-LINKED DIPHENYL MOIETIES |
| P31 | <u>V. Dudutienė</u> , A. Zubrienė, J. Kazokaitė, D. Matulis | DEVELOPMENT OF FLUORINATED BENZENESULFONAMIDES AS CARBONIC ANHYDRASE IX INHIBITORS |
| P32 | <u>B. Grybaitė</u> , R. Vaickelionienė, V. Mickevičius | SYNTHESIS OF NOVEL N-ARYL-N-POLYSUBSTITUTED THIAZOLYL- α -ALANINES |
| P33 | <u>M. Iškauskienė</u> , A. Urbonavičius, G. Ragaitė, M. Dagilienė, F. A. Sløk, A. Šačkus ^{1,2} | SYNTHESIS AND STRUCTURE DETERMINATION OF ALKYL N-(N-Boc-PIPERIDINYL)PYRAZOLECARBOXYLATES |
| P34 | <u>V. Jakubkienė</u> , G. E. Valiulis, M. Žvirblis, G. Žvinys, A. Zubrienė, D. Matulis | SYNTHESIS AND HDAC INHIBITORY ACTIVITY OF PYRIMIDINE-BASED HYDROXAMIC ACIDS |
| P35 | <u>A. Jankūnaitė</u> , V. Paketurytė, A. Zakšauskas, E. Čapkauskaitė | SYNTHESIS AND BINDING ANALYSIS OF CARBONIC ANHYDRASES INHIBITORS – 1,2-DISUBSTITUTED 6-CHLOROBENZIMIDAZOLE-5-SULFONAMIDES |
| P36 | <u>A. Jurys</u> , T. Javorskis, E. Orentas | SYNTHESIS AND APPLICATIONS OF DITHIADIAZOCANES |
| P37 | <u>E. Kasparavičius</u> , T. Malinauskas, V. Getautis | INVESTIGATION STABILITY OF OXIDIZED spiro-MeOTAD USED IN PEROVSKITE SOLAR CELLS |
| P38 | <u>P. Kaziukonytė</u> , E. Kazlauskas, A. Zubrienė, A. Brukštus | SYNTHESIS OF POTENTIAL HSP90 AND HDAC MULTITARGET INHIBITORS |
| P39 | <u>A. Klevinskas</u> , I. Tumosiene, I. Jonuškienė, K. Kantminienė | SYNTHESIS OF SHIFF BASES FROM 3-[(4-METHOXYPHENYL)AMINO]PROPANEHYDRAZIDE AND THEIR ANTIBACTERIAL ACTIVITY |
| P40 | C.-W. Liao, Y.-C. Hsh, C.-C. Chu, C.-H. Chang, <u>G. Krucaite</u> , D. Volyniuk, J. V. Grazulevicius, S. Grigalevicius | AGGREGATION-INDUCED EMISSION TETRAPHENYLETHENE TYPE DERIVATIVES FOR BLUE TANDEM ORGANIC LIGHT-EMITTING DIODES |
| P41 | <u>S. Macionis</u> , N. Sohrab, D. Gudeika, D. Volyniuk, J. V. Grazulevicius | SYNTHESIS AND INVESTIGATION OF THIOXANTHONE BASED COMPOUNDS EXHIBITING TADF, AIEE AND RTP EFFECTS |
| P42 | <u>M. Malikėnas</u> , L. Stančaitis, G. Petraitytė, V. Masevičius | SYNTHESIS OF 4-ARYL-2-CYANO-6-(4-METHOXYPHENYL)-5-PHENYLFURO[2,3-d]PYRIMIDINES VIA Pd(0) CATALYSED REACTIONS. STUDY ON PHOTOPHYSICAL PROPERTIES OF NON-LINEAR HETEROCYCLIC COMPOUNDS |
| P43 | <u>V. Malinauskienė</u> , M. Iškauskienė, A. Kveselytė, I. Nedzinskaitė, L. Burlėgaitė, A. Šačkus. | INDOLE CARBOXYLIC ACIDS AS STARTING POINT TOWARDS HETEROARYL INDOLES |

| | | |
|------------|--|---|
| P44 | M. Stasevych, V. Zvarych, V. Novikov, V. Vovk, Š. Žukauskas, V. Mickevičius | (9,10-DIOXOANTRACEN-1-YL)HYDRAZONES WITH AMIDOXIME MOIETY |
| P45 | V. Milišiūnaitė, E. Arbačiauskienė, E. Rezníčková, R. Jorda, V. Malínková, A. Žukauskaitė, W. Holzer, V. Kryštof, A. Šačkus | INVESTIGATION OF SYNTHESIS AND ANTI-MITOTIC ACTIVITY OF NOVEL 2H-PYRAZOLO[4,3-c]PYRIDINES |
| P46 | I. Misiūnaitė, V. Mikulėnaitė, V. Eiva, R. Bukšnaitienė, I. Karpavičienė | INVESTIGATION OF SYNTHETIC PATHWAY OF VARIOUS 2-(3-SUBSTITUTED PROP-2-YNYLTHIO) IMIDAZOLES via ELECTROPHILIC CYCLIZATION REACTIONS |
| P47 | B. Razmienė, V. Dambrauskienė, E. Arbačiauskienė, E. Rezníčková, A. Žukauskaitė, V. Kryštof, Algirdas Šačkus | SYNTHESIS AND BIOLOGICAL ACTIVITY OF 2,4,6,7-TETRASUBSTITUTED-2H-PYRAZOLO[4,3-c]PYRIDINES |
| P48 | U. Rimkaitė, I. Karpavičienė, E. Orentas | SYNTHESIS OF NDI MODEL COMPOUNDS POSSESSING STRAPPED – ALKENE MOIETY TO EXAMINE ARYL – ALKENE $\pi - \pi$ INTERACTION |
| P49 | J.Solovjova, M. Dagilienė, V. Dargytė, F. A. Sløk, A. Šačkus | SYNTHESIS OF NOVEL FUSED PYRAZOLE-AZEPANE DERIVATIVES |
| P50 | U. Šachlevičiūtė, G. Kliučinskaitė, G. Petkevičiūtė, R. Jančauskas, N. Kleizienė, F. A. Sløk, A. Šačkus | SYNTHESIS OF NOVEL CONSTRAINED ANALOGUES OF γ -AMINO BUTYRIC ACID (GABA) VIA THE Rh(I)-CATALYSED CONJUGATED ADDITION REACTION OF ARYLBORONIC ACIDS |
| P51 | S. Grigalevičius, D. Tavgenienė, G. Kručaitė, R. Grinienė, D. Blaževičius, M. Eidimtas, Y.-P. Wang, S.-R. Tsai, Ch.-H. Chang | NEW (BI)PHENYL SUBSTITUTED 9-(2,2-DIPHENYLVINYL)CARBAZOLES AS HOLE TRANSPORTING MATERIALS FOR EFFICIENT RED PHOLEDs |
| P52 | I. Styraitė, I. Tumosiene, I. Jonuškienė, K. Kantminienė | SYNTHESIS OF ISATIN HYDRAZONES AND INVESTIGATION OF THEIR ANTIOXIDANT AND ANTIBACTERIAL ACTIVITY |

POSTER SESSION II**16:00 – 17:00****Analytical chemistry**

| | | |
|------------|--|--|
| P53 | <u>B. Brasiūnas</u> , E. Baliūnaitė, E. Bučmys, A. Popov, A. Ramanavičiene | IMMUNOSENSOR FOR HUMAN GROWTH HORMONE DETECTION BASED ON INDIUM TIN OXIDE ELECTRODE WITH GOLD NANOSTRUCTURES |
| P54 | <u>E. Dauksaite</u> , A. Ramanaviciene, A. Kausaite-Minkstimiene | SURFACE PLASMON RESONANCE IMMUNOSENSORS FOR HGH DETECTION |
| P55 | <u>V. Kavaliauskas</u> , A. Žilionis | DETERMINATION OF PHTHALATES IN BOTTLED WATER BY ULTRA-HIGH PRESSURE LIQUID CHROMATOGRAPHY-TANDEM MASS SPECTROMETRY |
| P56 | <u>V. Lisyte</u> , B. Brasiunas ¹ , A. Popov, A. Ramanaviciene | GLUCOSE BIOSENSOR BASED ON GLUCOSE OXIDASE AND POLYANILINE NANOFIBERS |

Applied chemistry

| | | |
|------------|--|---|
| P57 | <u>O. Aleknavičiūtė</u> , R. Baranauskienė, P. R. Venskutonis | FRACTIONATION OF HEMP EXTRACTS BY USING SUPERCRITICAL CARBON DIOXIDE AND CO-SOLVENT ETHANOL |
| P58 | <u>G. Aleliūnaitė</u> , R. Baranauskienė, E. Dambrauskienė, P.R. Venskutonis | AROMA PROFILE AND TOTAL PHENOLICS IN LEMON BALM AND WHITE HOREHOUND ESSENTIAL OILS AND WATER EXTRACTS |
| P59 | <u>A. Banytė</u> , R. Baranauskienė, R. Žvirdauskienė, P.R. Venskutonis | AROMA PROFILE, TOTAL PHENOLICS AND ANTIMICROBIAL ACTIVITY OF SPEARMINT AND PEPPERMINT ESSENTIAL OILS AND WATER EXTRACTS |
| P60 | <u>R. Biškauskaitė</u> , V. Valeika | APPROACH TO GREENER PROCESS: ENZYMATIC PICKLING OF HIDE |
| P61 | <u>K. Dabrovolskas</u> , G. Krucaite, E. Skuodis, I. Jonuskiene, D. Gudeika | SYNTHESIS AND ANTIMICROBIAL ACTIVITIES OF CARBAZOLE-BASED COMPOUNDS |
| P62 | <u>N. Dukštienė</u> , V. Krylova | MORPHOLOGY OF POLYAMIDE 6/Se-S-Cd-Ag COMPOSITE MATERIALS |
| P63 | <u>G. Gaidamavičienė</u> , A. Žalga | CHARACTERIZATION OF La _{1.9} Ca _{0.1} Mo ₂ O _{8.95} CERAMICS SYNTHESIZED BY THE AQUEOUS SOL-GEL METHOD |
| P64 | <u>D. Gudeika</u> , A. Bundulis, S. Benhattab, M. B. Manaa, N. Berton, J. Bouclé, F. T. Van, B. Schmaltz, D. Volyniuk, J. V. Grazulevicius | DERIVATIVES OF DIMETHOXY-SUBSTITUTED TRIPHENYLAMINE CONTAINING DIFFERENT ACCEPTOR MOIETIES AS MULTIFUNCTIONAL DYES |
| P65 | <u>J. Januškevičius</u> , Ž. Stankevičiūtė, A. Kareiva | SOL-GEL SYNTHESIS AND SUBSEQUENT DIP-COATING ON SILICON OF YTTRIUM, TERBIUM IRON PEROVSKITES AND YTTRIUM IRON GARNET |
| P66 | <u>L. Jatautė</u> , V. Krylova | INVESTIGATION OF THE STRUCTURAL PROPERTIES OF SILVER-INDIUM SELENIDE LAYERS |

| | | |
|---------------------------|--|--|
| P67 | <u>V. Krylova</u> , N. Dukštienė, L. Jatautė | OPTICAL CHARACTERIZATION OF SILVER-INDIUM SELENIDE LAYERS ON ARCHITECTURAL TEXTILE |
| P68 | <u>N. Masimukku</u> , D. Gudeika, D. Volyniuk, J. V. Grazulevicius | SYNTHESIS AND INVESTIGATION OF BIPOLAR 1,8-NAPHTHALIMIDE-BASED COMPOUNDS |
| P69 | <u>A. Mikolaitienė</u> , E. Griškaitis, R. Šlinkšienė | ALGAE AND ASH AS PLANT FOOD IN GRANULATED FERTILIZERS |
| P70 | <u>N. Petrašauskienė</u> , R. Alaburdaitė, E. Paluckienė | INVESTIGATION OF Cu _x S LAYERS ON POLYAMIDE SURFACE BY SEM AND XRD |
| P71 | <u>R. Povilavičiūtė</u> , R. Skudžius, D. Budrevičius, J. Jurgelevičiūtė, E. Lastauskienė | IDENTIFICATION AND REDUCTION OF MICROBIOLOGICAL CONTAMINANTS IN HERBS |
| P72 | <u>L. Prakopaviciute</u> , E. Ragauskaite, D. Cizeikiene | ANTIMICROBIAL ACTIVITY OF SOME LACTOBACILLUS STRAINS AGAINST PATHOGENS |
| P73 | <u>L. Rezytė</u> , A. Zagorskis, M. Petrulevičienė, J. Juodkazytė, B. Šebeka, I. Savickaja, V. Pakštas, A. Naujokaitis | SYNTHESIS OF TUNGSTEN OXIDE THIN FILMS AND INVESTIGATION OF GAS SENSING PROPERTIES |
| P74 | <u>M. Steponaitis</u> , R. Komskis, E. Kamarauskas, T. Malinauskas, S. Jursenas, V. Getautis | INVESTIGATION OF PROPERTIES OF TRIPHENYLAMINE PHENYLETHENYL DERIVATIVES CONTAINING TERTIARY AMINE GROUPS |
| P75 | <u>R. Striela</u> , J.F. Devaux, J.L. Couturier, J.L. Dubois, A. Strakšys, S. Asadauskas | VIABILITY OF CASCADING APPLICATION OF POLYAMIDE WASTE INTO LUBRICANT BASESTOCK BY PARTIAL HYDROLYSIS |
| P76 | <u>L. Tamkutė</u> , B. Melero Gil, J. Rovira Carballido, P. R. Venskutonis | DEFATTED CRANBERRY POMACE EXTRACT INCREASES SAFETY AND ANTIOXDANT POTENTIAL OF PORK BURGERS DURING IN VITRO GASTROINTESTINAL DIGESTION |
| P77 | <u>A. Zdaniauskienė</u> , T. Charkova, I. Ignatjev, G. Niaura | SYNTHESIS OF Au NANOPARTICLES WITH SiO ₂ , MnO ₂ , AND TiO ₂ SHELLS FOR SURFACE ENHANCED RAMAN SPECTROSCOPY |
| P78 | <u>E. Zubrytė</u> , A. Gefenienė, D. Kaušpėdienė, S. Jankauskas, R. Ragauskas | USE OF COAGULATION AND ADSORPTION FOR THE REMOVAL OF SANODURE GREEN DYE BY GROUNDWATER TREATMENT RESIDUALS |
| Physical chemistry | | |
| P79 | <u>K. Antanavičiūtė</u> , Z. Sukackienė, L. Tamašauskaitė- Tamašiūnaitė, E. Norkus | HYDROGEN GENERATION FROM NaBH ₄ HYDROLYSIS USING CoBZn/Cu, CoBMo/Cu, CoBFe/Cu CATALYSTS |
| P80 | <u>I. A. Cechanaviciute</u> , M. Gicevicius, A. Ramanavicius | DIGITAL IMAGE CHARACTERIZATION OF ELECTROCHROMIC CONDUCTING POLYMER AND TEXTILE COMPOSITES |
| P81 | <u>L. Dargis</u> , E. Griškoniš, E. Valatka | ELECTROCHEMICAL DEPOSITION AND ELECTROCATALYTIC ACTIVITY OF Co-Ni PHOSPHATE COATINGS |
| P82 | <u>A. Ilginis</u> , E. Griškoniš | ELECTROCHEMICAL MODIFICATION OF GRAPHITE FELT IN LEAD(II) NITRATE ELECTROLYTE UNDER FLOW-THROUGH REGIME |

USE OF COAGULATION AND ADSORPTION FOR THE REMOVAL OF SANODURE GREEN DYE BY GROUNDWATER TREATMENT RESIDUALS

E. Zubrytė^{1*}, A. Gefenienė^{1,2}, D. Kaušpėdienė¹, S. Jankauskas¹, R. Ragauskas¹

¹Center for Physical Sciences and Technologies, Saulėtekio av. 3, Vilnius 10257, Lithuania

²Vytautas Magnus University, K. Donelaičio 58, Kaunas 44248, Lithuania

*E-mail: edita.zubryte@ftmc.lt

Sanodure Green LWN anionic azo dye is a commercial product used for dyeing of anodized aluminium. The dye deposited on the surface of aluminium oxide provides the transparent layer that reflects the colour [1]. Colour removal from wastewater is still a major challenge [2]. Several methods including coagulation-flocculation, adsorption, advanced oxidation processes, membrane techniques and biological degradation have been applied for decolourization of wastewater [3, 4]. In this work, a combined process of coagulation-flocculation and adsorption of Sanodure Green LWN dye was studied using groundwater treatment residuals (GWTR). The solid waste with the main component of ferric oxide/hydroxide represents a material with a dual function. During the treatment of wastewater containing Sanodure Green LWN dye, in an acidic medium it can act as coagulant as well as adsorbent. The optimum conditions for the dye removal were studied varying coagulant-adsorbent dosage, contact time and temperature. Factors influencing the decolourization process such as solution pH and dye concentration were also discussed. The dye removal efficiency (RE) increased with decreasing pH values from 6 to 2. Initial dye concentration was varied from 50 to 1000 mg/L to obtain sorption isotherms at 20°C temperature. An increase in temperature from 20 °C to 60 °C produces a negative impact on the removal efficiency of Sanodure Green LWN dye. As shown in Fig. 1, at 20 °C temperature the optimum time for the dye removal efficiency was obtained at 10 min. At higher temperature, it gradually decreases with time. The low cost inherently formed groundwater treatment residuals can be considered as an effective material on removing Sanodure Green LWN dye at short time periods.

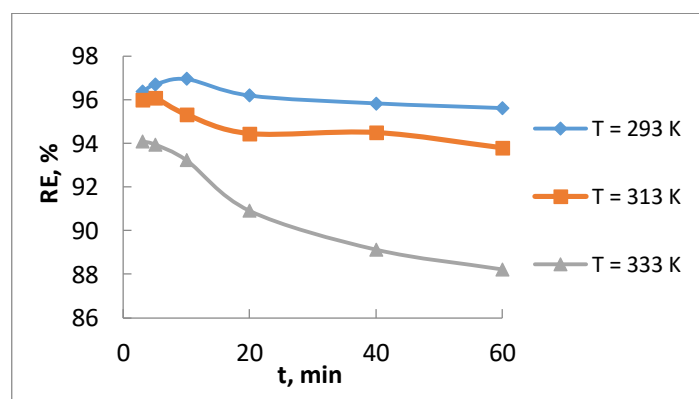


Fig. 1. Effect of contact time and temperature on the removal efficiency (RE) of the Sanodure Green LWN dye from 100 mg/L solution.

References

1. Ch.Ch. Chang, F.Ch. Chiang, S.M. Chen, K. Thangavelu, H.J. Yang, *Int. J. Electrochem. Sci.*, **11** (2016) 2142-2152.
2. A.K. Verma, R.R. Dash, P. Bhunia, *J. Environ. Manage.*, **93** (2012) 154-168.
3. M. C. Collivignarelli, A. Abbà, M. Carnevale Miino, S. Damiani, *J. Environ. Manage.*, **236** (2019) 727-745.
4. H. Nourmoradia, S. Zabihollahib, H.R. Pourzamanic, *Desalin. Water Treat.*, (2015) 1-12.

CORROSION OF ELECTROLYTIC MANGANESE COATINGS IN 3% NaCl SOLUTION

N. Žmuidzinašienė, A. Šulčius, E. Griškoniš

Kaunas University of Technology, Radvilėnų 19, 50254 Kaunas, Lithuania

E-mail: nerita.zmuidzinaviciene@ktu.lt

Corrosion properties of Mn coatings depend on their mechanical properties and electrodeposition conditions, therefore corrosion potentials of electrolytic Mn coatings deposited on mild steel substrate from the manganese ammonium sulphate bath (MASB) with 2.20 mmol/l Te(VI) additive at different cathodic current density (10–30 A/dm²) and temperatures (20–80°C) were measured in naturally aerated 3% aqueous NaCl solution at the initial immersion moment and potential change with time.

Investigation of corrosion of Mn coatings in 3% NaCl medium has led to the conclusion that Mn coatings interfere with Te in a similar manner as Se [1 – 3], and consequently the corrosion resistance of coatings increases in chloride solution.

At the initial moment of the immersion into 3% NaCl solution, the corrosion potentials of Mn coatings deposited from the MASB with 2.20 mmol/l Te(VI) additive at cathode current density 15 A/dm² and at temperatures in the range of 20°C–80°C, are very similar and fall into the -1250 – -1300 mV range. During the first day, corrosion potential of Mn coatings deposited from 20 °C MASB increased the most, namely up to -1100 mV, the one of the coating deposited at 40 °C increased very slightly, i.e. up to -1200 mV, while the potential for the coatings deposited from 60 °C and 80 °C MASB remained almost unchanged. During the 2-4 days, potentials of the Mn coatings deposited at 20°C, 40°C and 60°C gradually increased until -1070 mV, -1140mV and -1190 mV, respectively. During the 5–10 days, potentials of the Mn coatings deposited from 20 °C and 40 °C MASB remained stable, whereas the one for the coatings deposited at 60 °C continued to increase. Meanwhile, within 2–10 days potential of Mn coatings deposited at 80 °C increased very slightly up to -1250 mV, but its value remained the lowest.

The calculated corrosion current strengths of Mn coatings has shown that Mn coatings electrodeposited from MASB with 2.20 mM Te (VI) additive at 20°C and 40°C and cathode current density 15 A/dm² corroded the fastest at the initial moment of the immersion into a corrosive medium. However, after 1 day corrosion slowed down from 4 to 2 times, whereas after 3–10 days these coatings corroded 2.5–3 times slower than at the moment of initial immersion into the corrosive medium.

References

1. J.C. Rojas-Montes, R. Pérez-Garibay, A. Uribe-Salas, S. Bello, *Journal of Electroanalytical Chemistry* 803 (2017) 65–71
2. Fuyuan Xu, Zhigang Dan, Weinan Zhao, Guimei Han, Zehui Sun, Ke Xiao, Linhua Jiang, Ning Duan, *Journal of Electroanalytical Chemistry* 741 (2015) 149–156
3. Jian-rong XUE, Hong ZHONG, Shuai WANG, Chang-xin LI, Fang-fang WU, *Trans. Nonferrous Met. Soc. China* 26(2016) 1126–1137

Index of authors

- A**
Adamczyk Z., [20](#)
Adomėnienė A., [22](#)
Aglinskaitė J., [101](#)
Akmanov A., [30](#)
Alaburdaitė R., [104](#)
Aleknavičiūtė O., [31](#)
Aleliūnaitė G., [32](#)
Almonaityte K., [33](#)
Ancutienė I., [46](#)
Antanavičiūtė K., [34](#)
Anusevičius K., [36](#)
Arbačiauskienė E., [96](#), [111](#)
Asadauskas S., [25](#), [45](#), [69](#), [125](#)
Asadauskas S. J., [88](#)
Aukštakojytė R., [35](#)
- B**
Babičeva A., [78](#)
Balandis B., [36](#)
Balčiūnas E., [51](#), [80](#)
Baliūnaitė E., [43](#)
Baltakys K., [37](#), [79](#), [115](#)
Baltriukienė D., [51](#), [80](#)
Baltrūnaitė L., [38](#)
Banytė A., [39](#)
Baranauskienė R., [31](#), [32](#), [39](#)
Barkauskas J., [35](#)
Batutis M., [68](#)
Baublytė M., [40](#)
Beganskiene A., [40](#), [93](#), [94](#)
Bėkiš J., [88](#)
Bendoraitiene J., [33](#)
Benhattab S., [59](#)
Berton N., [59](#)
Biškauskaitė R., [41](#)
Blaževičius D., [42](#), [128](#)
Bledzki A. K., [52](#)
Boyacı I. H., [16](#)
Bouclé J., [59](#)
Brasiūnas B., [43](#), [86](#)
Braukyla T., [44](#)
Bražinskienė D., [45](#), [69](#)
Bronušienė A., [46](#)
Brukštus A., [75](#)
Bučmys E., [43](#)
Budrevičius D., [107](#)
Budrienė S., [51](#), [56](#), [80](#)
- B**
Bukelskienė V., [51](#), [80](#)
Bukšnaitienė R., [98](#)
Bundulis A., [59](#)
Burlėgaitė L., [90](#)
- C**
Cechanaviciute I. A., [47](#)
Chang C.H., [82](#)
Chang Ch.-H., [128](#)
Charkova T., [132](#)
Chu C.C., [82](#)
Cizeikiene D., [108](#)
Couturier J. L., [125](#)
- Č**
Čapkauskaitė E., [64](#)
- D**
Dabrilaitė-Kudžmienė G., [66](#)
Dabrovolskas K., [50](#)
Dagilienė M., [62](#), [121](#)
Dambrauskas T., [79](#), [115](#)
Dambrauskienė E., [32](#)
Dambrauskienė V., [111](#)
Danilovas P.P., [38](#), [52](#), [103](#), [109](#)
Dargis L., [48](#)
Dargytė V., [121](#)
Daškevičienė M., [44](#)
Dauksaitė E., [49](#)
Devaux J. F., [125](#)
Dienaitė L., [23](#)
Drabavičius Ž., [51](#)
Druktienytė A., [52](#)
Dubois J. L., [125](#)
Dudutienė V., [53](#), [120](#)
Dukštienė N., [54](#), [81](#)
- E**
Eidimtas M., [128](#)
Eisinas A., [79](#)
Eiva V., [98](#)
- F**
Franciszczak P., [52](#)
- G**
Gabriūnaitė I., [106](#)
Gaidamavičienė G., [55](#)
Gaidukevič J., [35](#), [114](#)
Gailiūnaitė S., [56](#)
Gefenienė A., [134](#)
Getautis V., [44](#), [73](#), [123](#)
Gicevicius M., [47](#)
Grazulevicius J. V., [59](#), [82](#), [85](#), [87](#), [91](#)
Grybaitė B., [57](#)

Grigalevicius S., [42](#), [82](#), [128](#)
Grigoraviciute-Puroniene I., [58](#), [117](#), [131](#)
Grigorjevaite J., [24](#)
Grinienė R., [128](#)
Griškaitis E., [95](#)
Griškonis E., [48](#), [60](#), [83](#), [135](#)
Gruodis A., [44](#)
Gudeika D., [30](#), [50](#), [59](#), [87](#), [91](#), [105](#)
Gurevičienė V., [114](#)
Gustytė U., [45](#)
Holzer W., [96](#)
Hsh Y.C., [82](#)
Huang Sheng-Tung, [17](#)
Ignatjev I., [132](#)
Ilginis A., [60](#)
Inkrataitė G., [61](#)
Iškauskienė M., [62](#), [90](#)
Ivanauskas A., [84](#)
Ivanauskas R., [84](#)
Jakubkienė V., [63](#)
Jankauskas R., [126](#)
Jankauskas S., [134](#)
Jankauskas V., [44](#)
Jankūnaitė A., [64](#)
Janulevičius M., [78](#)
Januškevičius J., [65](#)
Jaskūnas A., [66](#)
Jasulaitienė V., [25](#)
Jatautė L., [67](#), [81](#)
Javorskis T., [70](#)
Jonikaitė-Švėgždienė J., [68](#)
Jonuškienė I., [50](#), [77](#), [129](#)
Jorda R., [96](#)
Jukna A., [69](#)
Juodkazytė J., [112](#)
Juozapaitienė V., [120](#)
Jurgelevičiūtė J., [107](#)
Jurys A., [70](#)
Jursenas S., [123](#)
Kaba M. M., [71](#)
Kamarauskas E., [123](#)
Kaminskas R., [99](#)
Kantminienė K., [77](#), [129](#)
Kareiva A., [58](#), [65](#), [71](#), [72](#), [93](#), [117](#), [131](#)
Karoblis D., [72](#)
Karpavičienė I., [98](#), [113](#)
Kasparavičius E., [73](#)
Katelnikovas A., [24](#), [78](#), [101](#)

Kausaite-Minkstimiene A., [49](#)
Kaušpėdienė D., [134](#)
Kavaliauskas V., [74](#)
Kaziukonytė P., [75](#)
Kazlauskas E., [75](#)
Kazokaitė J., [53](#)
Kepenienė V., [122](#)
Keruckiene R., [85](#)
Khaja Nazeeruddin M., [44](#)
Kybartienė N., [76](#)
Kisieliute A., [133](#)
Kitrys S., [66](#)
Kleizienė N., [126](#)
Klevinskas A., [77](#)
Klimkevičius V., [78](#), [124](#)
Kliučinskaitė G., [126](#)
Knabikaitė I., [79](#)
Kochanė T., [51](#), [56](#), [80](#)
Komskis R., [123](#)
Krylova V., [54](#), [67](#), [81](#)
Kryštof V., [96](#), [111](#)
Krucaite G., [50](#), [82](#), [128](#)
Kuncė D., [83](#)
Kunciute A., [84](#)
Kveselytė A., [90](#)
Lapienyte L., [85](#)
Lastauskienė E., [107](#)
Lebedyte I., [93](#)
Liao C.W., [82](#)
Lisyte V., [86](#)
Liubinienė M., [40](#)
Lupa D., [20](#)
Maciejewska-Prończuk J., [20](#)
Macionis S., [87](#)
Mačiulytė S., [45](#), [88](#)
Makuška R., [68](#), [78](#), [124](#)
Malikėnas M., [89](#)
Malinauskas T., [44](#), [73](#), [123](#)
Malinauskienė V., [90](#)
Malínková V., [96](#)
Mameniškis M. P., [68](#)
Manaa M. B., [59](#)
Marchetti F., [18](#)
Masevičius V., [89](#)
Masimukku N., [91](#)
Matijošius T., [25](#)
Matulevičius M., [68](#)
Matulis D., [53](#), [63](#), [120](#)
Mekhalif Z., [19](#)

Melero Gil B., [127](#)
Meri M. R., [52](#)
Michailovienė V., [120](#)
Michna A., [20](#)
Mickevičius V., [36](#), [57](#), [92](#)
Mikalauskaitė I., [93](#), [94](#)
Mikolaitienė A., [95](#)
Mikulėnaitė V., [98](#)
Milišiūnaitė V., [96](#)
Minickaite R., [105](#)
Misevicius M., [97](#)
Misiūnaitė I., [98](#)
Momblona C., [44](#)
Monstvilaite D., [99](#)
Morga M., [20](#)
Morkan I., [71](#)
Morkvenaite-Vilkonciene I., [133](#)
N
Nattich-Rak M., [20](#)
Naujokaitis A., [112](#)
Navaruckiene A., [100](#)
Navickaitė L., [56](#), [80](#)
Navikaite-Snipaitiene V., [116](#)
Nedzinskaitė I., [90](#)
Niaura G., [132](#)
Norkus E., [34](#), [122](#)
Norkus M., [101](#)
Novikov V., [92](#)
O
Oćwieja M., [20](#)
Orentas E., [70](#), [113](#)
Ostrauskaite J., [100](#)
P
Paitian R., [131](#)
Pakalniškis A., [102](#)
Paketurytė V., [64](#)
Pakštas V., [112](#)
Palikšienė K., [103](#)
Paluckienė E., [104](#)
Paulauskaitė K., [94](#)
Petkevičiūtė G., [126](#)
Petraitytė G., [89](#)
Petrašauskienė N., [104](#)
Petrauskas A., [26](#)
Petrulevičienė M., [112](#)
Piesliakaite M., [105](#)
Plečkaitytė G., [93](#), [94](#)
Poderitė M., [106](#)
Pomorska A., [20](#)
Popov A., [43](#), [61](#), [86](#), [117](#)
Povilavičiūtė R., [107](#)
Prakopaviciute L., [108](#)
Prašmutas G., [109](#)
Prichockiene E., [110](#)
Pukalskas A., [23](#)
Pukalskienė M., [23](#)
R
Rabiej D., [27](#)
Ragaitė G., [62](#)
Ragauskaitė E., [108](#)
Ragauskas R., [134](#)
Ramanavičienė A., [43](#), [49](#), [86](#), [133](#)
Ramanavičius A., [47](#), [133](#)
Razmienė R., [111](#)
Razumienė J., [114](#)
Rezgytė L., [112](#)
Řezníčková E., [96](#), [111](#)
Rimkaitė U., [113](#)
Rimkutė G., [114](#)
Roldán-Carmona C., [44](#)
Rovira Carballido J., [127](#)
Rubinaitė D., [115](#)
Rudelis V., [37](#)
Rugevičiūtė J., [130](#)
Rutkaite R., [33](#)
S
Sapijanskaitė B., [36](#)
Sarapajevaite G., [37](#)
Savickaja I., [112](#)
Schmaltz B., [59](#)
Selskis A., [122](#)
Simanaviciute D., [116](#)
Sinusaite L., [117](#)
Skaudžius R., [61](#), [101](#), [102](#), [107](#)
Skirbutas J., [119](#)
Skuodis E., [50](#)
Sløk F. A., [62](#), [121](#), [126](#)
Smalakys G., [118](#)
Smalenskaite A., [71](#)
Smirnovienė J., [120](#)
Sohrab N., [87](#)
Solovjova J., [121](#)
Stagniūnaitė R., [122](#)
Stalnionis G., [25](#)
Stančaitis L., [89](#)
Stankevičiūtė Ž., [65](#)
Stasevych M., [92](#)
Steponaitis M., [123](#)
Steponavičiūtė M., [124](#)
Styraitė I., [129](#)
Strakšys A., [88](#), [125](#)
Striela R., [125](#)
Sukackienė Z., [34](#), [122](#)

Sutkuvienė S., [42](#)
Szydłowska-Czeraniak A., [27](#)
Šachlevičiūtė U., [126](#)
Šačkus A., [62](#), [90](#), [96](#), [111](#), [121](#), [126](#)
Šakinytė I., [114](#)
Šebeka B., [112](#)
Šiaučiūnas R., [110](#), [118](#)
Šlinkšienė R., [95](#)
Šmigelskytė A., [119](#)
Šulčius A., [135](#)
Takulinskas Ž., [119](#)
Tamašauskaitė-Tamašiūnaitė L., [34](#), [122](#)
Tamkutė L., [127](#)
Tavgenienė D., [42](#), [128](#)
Tran Van F., [59](#)
Tsai S.-R., [128](#)
Tumosienė I., [77](#), [129](#)
Urbonavičius A., [62](#)
Urbonavičiūtė G., [76](#)
Urnikis R., [66](#)
Vaickelionienė R., [57](#)
Valančienė V., [130](#)
Valatka E., [48](#)
Valeika V., [41](#)
Valeikiene L., [131](#)
Valiulis G. E., [63](#)
Valiūnienė A., [28](#), [106](#)
Valsiūnas I., [25](#)
Vegelyte V., [58](#)
Venskutonis P. R., [22](#), [23](#), [31](#), [32](#), [39](#), [127](#)
Vilčiauskaitė U., [38](#)
Vilius A., [133](#)
Vitta P., [101](#)
Volyniuk D., [59](#), [82](#), [85](#), [87](#), [91](#)
Vovk V., [92](#)
Wang Y.-P., [128](#)
Wasilewska M., [20](#)
Xia Rui, [44](#)
Zagorskis A., [112](#)
Zakšauskas A., [64](#)
Zarkov A., [72](#), [117](#)
Zdaniauskienė A., [132](#)
Zhang B., [42](#)
Zicans. J., [52](#)
Zinovicius A., [133](#)
Zubrienė A., [53](#), [63](#), [75](#), [120](#)
Zubrytė E., [134](#)
Zvarych V., [92](#)
Žalga A., [55](#)
Žilionis A., [74](#)
Žmuidzinavičienė N., [135](#)
Žukauskaitė A., [96](#), [111](#)
Žukauskas Š., [92](#)
Žvinys G., [63](#)
Žvirblis M., [63](#)
Žvirdauskienė R., [39](#)