MatCatNet Workshop
“From Molecules to Functionalised Materials“

Scientific module “Polymers”

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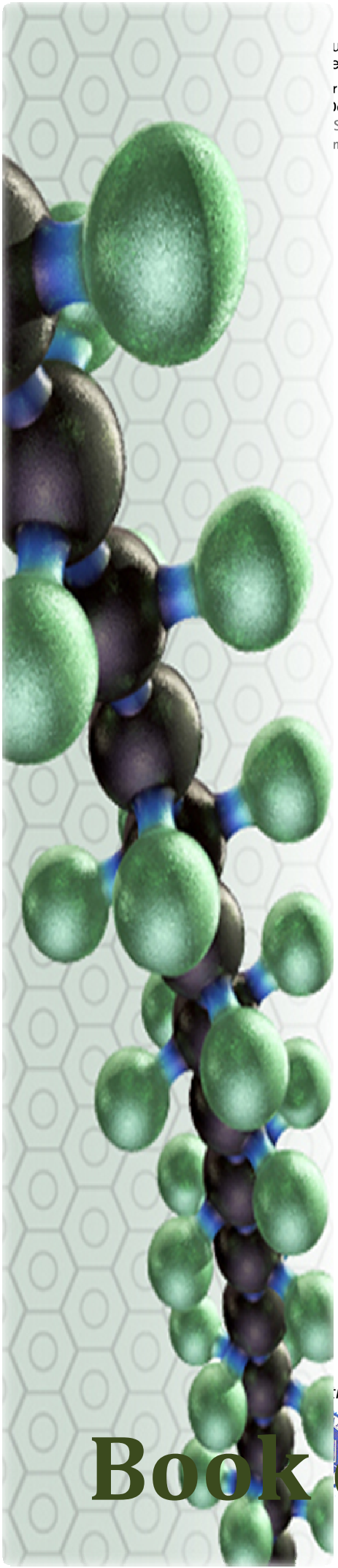

ional Master and Postgraduate Programme in Material Science and Catalysis

Book of Abstracts

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5-10 September 2014, Ohrid, Macedonia

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INTERNATIONAL MASTER AND POSTGRADUATE PROGRAMME IN MATERIALS SCIENCE AND CATALYSIS

MatCatNet

05.09-10.09.2014

Ohrid, Macedonia

"Ss. Cyril and Methodius" University

Institute of Chemistry, Faculty of Natural Sciences and Mathematics, Skopje, Macedonia

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UNIVERSITY OF PRISHTINA

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P R O G R A M M E

MatCatNet Workshop
"From Molecules to Functionalised Materials"
Scientific module "Polymers"

5-10 September, 2014, Ohrid, Macedonia

Friday, 5 September 2014

09.00 **Registration**

10.30 **Prof. Valentin Mirčeski**
Welcoming address

10.35 **Prof. Luminita Silaghi-Dumitrescu**
Overview of the project

Scientific module "Polymers"

-Lectures-

11:00-12:00 **Ass. Prof. Avni Berisha (Prishtina)**
Polymers – a basic introduction

12:00-13:00 **Prof. Luminita Silaghi-Dumitrescu (Cluj-Napoca)**
Organometallics in polymer chemistry

13:00-14:30 *Lunch*

14:30-16:30 **Prof. Valentin Mirčeski (Skopje)**
Electrochemical techniques for studying conducting polymers

16:30-16:45 *Coffee Break*

16:45-17:45 **Prof. Rubin Gulaboski (Štip)**
Voltammetry of conducting polymers

Saturday, 6 September 2014

09:00-10:00 **Prof. Fetah Podvorica (Prishtina)**
Electrografting of polymers onto material surfaces

10:00-11:00 **Prof. Blaga Radovanović (Niš), Ass. Prof. Marjan Randjelović (Niš)**
Investigation of rubber-filler interactions of nano- and micro-filled crosslinked polymer blends

11:00-11:15 *Coffee Break*

11:15-12:15 **Assoc. Prof. Dragan Djordjević (Niš)**
Geopolymers

12:15-13:15 **Ass. Prof. Luljeta Raka (Tetovo)**
Sythesis, structure and properties of polypropylene/clay nanohybrids

13:15-14:45 *Lunch*

14:45-15:45 **Prof. Gordana Bogoeva-Gaceva (Skopje, invited lecturer)**
Interface in polymer composite materials

15:45-16:45 **Ass. Prof. Vineta Srebrenkoska (Štip)**
Preparation and recycling of polymer eco-composites

16:45-17:00 *Coffee Break*

17:00-18:30 **Assoc. Prof. Vladimir Ivanovski (Skopje)**
IR spectroscopy of polymers

18:30-20:00 *Sightseeing of Ohrid old city (walking tour I)*

Sunday, 7 September 2014

09:00-11:00 **Prof. Muriel Hissler (Rennes, invited lecturer)**
π-conjugated polymers for (opto)electronic devices

MatCatNet Workshop

-Students' oral presentations-

(chair: Jeton Halili)

11:00 **Miha Bukleski**
(Faculty of Natural Science and Mathematics, "Ss. Cyril and Methodius" University, Skopje, Macedonia)
Quantification of the maximal chemisorbed 3-aminopropylsilyl groups on silica gel using DRIFT spectroscopy

11:15 **Mihaela Vasile**
(Faculty of Chemistry and Chemical Engineering, Babes-Bolyai University, Cluj-Napoca, Romania)
The evaluation of absorption of carbon dioxide in alkanolamines through dynamic modeling

11:30 **Egzon Ademi**
(Faculty of Natural and Mathematical Science, State University of Tetovo, Tetovo, Macedonia)
Coupling of some six membered heterocycles with 4-hydroxycoumarin through the hydrazinylidene link

11:45-12:00 *Coffee Break*

(chair: Vladimir Radovanovič)

12:15 **Jeton Halili**
(Faculty of Natural Science, University of Prishtina, Prishtina, Kosovo)
Supercritical CO_2 extraction of heavy metals from aquaeous solution by using chelate ligand - dithizone

12:30 **Adrian Brânzanic**
(Faculty of Chemistry and Chemical Engineering, Babes-Bolyai University, Cluj-Napoca, Romania)
Archaeometric studies on ancient oxidic materials from Romania

12:45 **Katerina Stankoska**
(Faculty of Natural Science and Mathematics, "Ss. Cyril and Methodius" University, Skopje, Macedonia)
Studying CE mechanism at three-phase electrode, where coupled electron-ion transfer is complicated by complexation of the transferring ion

13:00-14:00 *Lunch*

(Chair: Sasho Stojkovikj)

14:00 **Zulihaje Ismaili**
(Faculty of Natural and Mathematical Science, State University of Tetovo, Tetovo, Macedonia)
High density-polyethylene for pharmaceutical industry: thermal characterization

14:15 **Nikolina Mitreska**
(Faculty of Natural Science and Mathematics, "Ss. Cyril and Methodius" University, Skopje, Macedonia)
Hydroxylated derivatives of coenzyme Q_1 as ligands for complexation of transition metals

14:30 **Jeta Sela**
(Faculty of Natural and Mathematical Science, State University of Tetovo, Tetovo, Macedonia)
Synthesis and characterization of Co(II) and Ni(II) complexes with schiff bases derived from salicylaldehyde

14:45 Dijana Jadreško
(Faculty of Natural Science and Mathematics, "Ss. Cyril and Methodius" University, Skopje, Macedonia)
Characterization of electrode processes by cyclic square-wave voltammetry (CSWV)

15:00 Valdrin Januzaj
(Faculty of Natural Science, University of Prishtina, Prishtina, Kosovo)
Composite electrodes with carbon supported Ru-nanoparticles for H_2O_2 detection

15:15 Violeta Ivanova-Petropuos
(Faculty of Agriculture, University "Goce Delčev", Štip, Macedonia)
Multi-element analysis of wines

15:30-16:00 *Coffee Break*

16:00-17.00 Project coordinators meeting
Evaluation of the project and future perspectives of the network

17:00-19:00 *Sightseeing of Ohrid old city*
(walking tour II)

Monday, 8 September 2014

09:00-10:00 Prof. Muriel Hissler (Rennes, invited lecturer)
Phosphole-based compounds for optoelectronic applications

-Students' oral presentations-

(Chair: Mihaela Vasile)

10:00 Njomza Buxhaku
(Faculty of Natural and Mathematical Science, State University of Tetovo, Tetovo, Macedonia)
Hydrothermal reaction of tripoli with calcium hydroxide

10:15 Biljana Balabanova
(Faculty of Medical Science, "Goce Delčev" University, Štip, Macedonia)
Characterization of macro and trace elements contents in edible oils with application of microwave digestion and ICP-MS

10:30 Sasho Stojkovikj
(Faculty of Natural Science and Mathematics, "Ss. Cyril and Methodius" University, Skopje, Macedonia)
Development of nonenzymatic amperometric sensor for detection of hydrogen peroxide based on Manganese(II) carbonate thin films

10:45 Abibe Useini
(Faculty of Natural and Mathematical Science, State University of Tetovo, Tetovo, Macedonia)
Baylis-hillman reactions catalyzed by hexamethylenetetramine

11:00 Szőke Árpád Ferenc
(Faculty of Chemistry and Chemical Engineering, Babes-Bolyai University, Cluj-Napoca, Romania)
The incubation of indigo carmine in sol-gel coatings

11:15-11:30 *Coffee Break*

-Students' Poster Flash Presentations-

(Chair: Arianit Reka)

11:30 Elena Drakalska
(Faculty of Medical Science, "Goce Delčev" University, Štip, Macedonia)
Preparation and characterization of polyoxythylated tert-buthylcalix[4]arene nanoparticles as platforms for delivery of curcumin

11:40 Ivana Vuchkovikj
(Faculty of Natural Science and Mathematics, "Ss. Cyril and Methodius" University, Skopje, Macedonia)
Study of nitrogen pollution in Croatia by moss biomonitoring and Kjeldahl method

11:50 Nikola Stojkovic
(Faculty of Science and Mathematics, University of Niš, Niš, Serbia)
Preparation and photocatalytic activity of templated mesoporous TiO_2 thin films with selected polymers

12:00 Belinda Aliu
(Faculty of Natural and Mathematical Science, State University of Tetovo, Tetovo, Macedonia)
Synyhesis of ferum complexes with 3-[2-(thiazol-2-yl)hydrazinylidene]chroman-2,4-dione

(Chair: Biljana Balabanova)

12:10 Viktorija Maksimova
(Faculty of Medical Science, "Goce Delčev" University, Štip, Macedonia)
Electrochemical behavior of capsaicin and its anti-oxidative properties studied by means of cyclic voltammetry

12:20 Milica Stankovic
(Faculty of Science and Mathematics, University of Niš, Niš, Serbia)
Cornelian cherry fruit and leaf extracts as potential drugs

12:30 Luana Radu
(Faculty of Chemistry and Chemical Engineering, Babes-Bolyai University, Cluj-Napoca, Romania)
Noncovalent interactions between hemoglobin and compounds with potential biological activity

12:40 Marija Sterjova
(Faculty of Medical Science, "Goce Delčev" University, Štip, Macedonia)
Evaluation radiochemical purity of ^{177}Lu-labelled rituximab conjugates using HPLC method

12:50 Dora Chisalita
(Faculty of Chemistry and Chemical Engineering, Babes-Bolyai University, Cluj-Napoca, Romania)
Lower rim functionalized calix[8]arenes coupling to silica surface

13:00 Vladimir Radovanovic
(Faculty of Science and Mathematics, University of Niš, Niš, Serbia)
Optimization of ultrasonic extraction of polyphenols from grape waste using design expert software

13:10 Arianit Reka
(Faculty of Natural and Mathematical Science, State University of Tetovo, Tetovo, Macedonia)
Low temperature reaction of amorphous SiO_2 with calcium hydroxide

13:30-14:30 *Lunch*

14:30-18:00 *Guided tour to the Monastery St. Naum and springs of Ohrid's Lake*

20:00 *Gala Dinner*

Tuesday, 9 September 2014

(Chair: Adrian Branzanic)

09:00 Liridona Useini
(Faculty of Natural and Mathematical Science, State University of Tetovo, Tetovo, Macedonia)
Synthesis of 4-aryl/alkylaminocoumarines by using microwave

09:10 Stefan Mihajlovic
(Faculty of Science and Mathematics, University of Niš, Niš, Serbia)
Effect of selective removal of grapevine leaves of cabernet sauvignon polyphenolic content

09:20 Tanja Dimitrova
(Faculty of Natural Science and Mathematics, "Ss. Cyril and Methodius" University, Skopje, Macedonia)
Microwave-assisted organic synthesis of some N-alkyl substituted isatin 3-thiocarbohydrazones

09:30 **Marija Atanasova**
(Faculty of Medical Science, "Goce Delčev" University, Štip, Macedonia)
Determination of oxidative status in EDTA plasma of hemodialysis patients by peroxide assay

09:40 **Milica Ristic**
(Faculty of Science and Mathematics, University of Niš, Niš, Serbia)
Geochemical analysis of trace metals: Sokobanja limestone

09:50 **Rudina Veliu**
(Faculty of Natural and Mathematical Science, State University of Tetovo, Tetovo, Macedonia)
Baylis-hillman reactions catalyzed by hezamethylenetetramine

10:00 **Vicentiu Taciuc**
(Faculty of Chemistry and Chemical Engineering, Babes-Bolyai University, Cluj-Napoca, Romania)
Mechanistic investigations of undesired prooxidant reactions in compounds and natural extracts with antioxidant activity

10:10 ***General discussion on poster results***

12:00-14:00 *Lunch*

14:00 ***Award Ceremony, Closing remarks***

15:00 *Social event*

Wednesday, 10 September 2014

09:00 *Departure*

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SCIENTIFIC AND METHODS MODULE

"POLYMERS"

SCIENTIFIC AND METHODS MODULE

Module name	**Polymers**
Number	2014-MatCatNet03
Aims	The module aims at providing the participants with some detailed understanding of polymers. Lectures cover historical aspects, basic definitions, structure and classification, polymer formation mechanisms based on step-growth, chain-growth polymerization, Ziegler-Natta polymerization, Ring Opening Polymerization (ROP), Ring Opening Metathesis Polymerization (ROMP), etc. The following aspects will be also highlighted: - commercially important polymers - conducting polymers, ionomers, dendrimers, etc. as well as novel applications of these materials - most frequently used electrochemical techniques for studying conducting and redox-active polymers - most important examples of conductive polymers used in electrochemistry focusing on their features and applications - polymer electrografting methods, electrografting of polymer conductors - cross-linking polymer systems - geopolymers - polymer composite materials - polymer/clay nanohybrids
Basics	Basic knowledge of organic, inorganic chemistry; basic understanding of electrochemical experiments; electrochemistry; organometallic compounds, transition metal complexes; nanoparticles; basic knowledge of analytical and physical chemistry
Contents	Aspects of polymer chemistry
Type	Two-day block course
Date (month/year)	7 to 9 September 2014
Time	Day 1: 11:00 – 17:45, Day 2: 9:00 – 18:00, Day 3: 9:00 – 10:00
Work load	15 contact hours/ 45 hours self-study
Examination	written
Credit points	2

Responsible scientists	Valentin Mirceski (MK), Rubin Gulaboski (MK), Luminita Silaghi-Dumitrescu (RUM), Avni Berisha (KOS), Fetah Podvorica (KOS), Blaga Radovanovic (SER), Dragan Djordjevic (SER), Marjan Randjelkovic (SER), Luljeta Raka (MK),
Guest lecturers	Gordana Bogoeva-Gaceva (MK), Muriel Hissler (FR);
Recommendations for literature, e-learning	• A. Ravve, Principles of Polymer Chemistry, Springer, 2012 • C. E. Carraher Jr., Carraher's Polymer Chemistry, CRC Press, 2013 • R. J. Young, P. A. Lovell Introduction to Polymers, CRC Press, 2011 • A. Ansarifar, R. Nijhawan, T. Nanpoolsin, M. Song, Rubber Chem Technol 2003, 76, 1290-1243 • B. Radovanovic, G. Markovic, J. Budinski-Simendic, H. Valentova, M. Illavsky, M. Marinovic-Cicovic, Mater. Sci. Forum 2005, 494, 475-480 • G. Markovic, B. Radovanovic, J. Budinski Simendic, M. Marinovic Cincovic, J. Serb. Chem. Soc. 2004, 69, 167-173 • B. Durand, Kerogen. Technip, Paris, 1980 • B. Durand, Sedimentary organic matter and kerogen. Definition and quantitative importance of kerogen, Kerogen Technip, Paris, 1980, p. 13-34 • B. P. Tissot, D. H. Welte, Petroleum formation and occurrence. Springer-Verlag, Berlin,1984 • D. Bélanger, J. Pinson, Chem. Soc. Rev. 2011, 49, 3995-4048 • S. Gabriel, R. Jérôme, C. Jérôme, Progress in Polymer Science 2010, 35, 113-140 • S. Mahouche-Chergui, S. Gam-Derouich, C. Mangeney, M. M. Chehimi, Chem. Soc. Rev. 2011, 40, 4143-4166 • M. M. Chehimi, Aryl Diazonium Salts. New Coupling Agents in Polymer and Surface Science, Wiley-VCH, Weinheim, 2012 • V. Kinzig, B. J. Kinzig, Composite application. The role of matrix, fiber and interface, VCH Publ. Inc., 1992 • L. Tzounis, Materials and Design, 2014, 58, 1; J. Rausch, eXPpress Polymer Lett. 2010, 4, 576-588 • G. Bogoeva-Gaceva, A. Janevski, E. Mäder, Polymer 2001, 42, 4409-4416 • S. S Ray, M. Okamoto. *Prog. Polym. Sci.* 2003, 28, 1539-64 • D. R. Paul, L. M. Robeson, Polymer 2008, 49, 3187-3204 • L. Raka, G. Bogoeva-Gaceva, J. Loos, *J. Therm. Analys. Calorim.* 2010, 100, 629-639 • L. Raka, G. Bogoeva-Gaceva, K. Lu, J. Loos, *Polymer* 2009, 50, 3739-3746 • H-H. Brintzinger, D. Fischer, R. Mulhaupt, B. Rieger, R. M. Waymouth, *Angew. Chem. Int. Ed. Engl.* 1995, 34, 1143-1170 • G. W.Coates, *Chem. Rev.* 2000, 100, 1223-1252 • L. Resconi, L. Cavallo, A. Fait, F. Piemontesi, *Chem. Rev.* 2000, 100, 1253-1346 • E. Y-X. Chen, T. J. Marks, *Chem. Rev.* 2000, 100, 1391-1434 • M. R. Buchmeiser, *Chem. Rev.* 2000, 100, 1565-1604 • O. Nuyken, S. D. Pask, *Polymers* 2013, 5, 361-403 • A. J. Bard, L. R. Faulkner, Electrochemical methods: Fundamentals and Applications, John Wiley & Sons, 2001 • G. Inzelt, Conducting Polymers. A New Era in Electrochemistry, Springer-Verlag Berlin Heidelberg, 2008

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SCHEDULE 2014

Time	Lecturer	Programme	Location
Day 1			
11:00-12:00	Avni Berisha (Prishtina)	Polymers – a basic introduction	Ohrid, MK
12:00-13:00	Luminita Silaghi-Dumitrescu (Cluj-Napoca)	Organometallics in polymer chemistry	Ohrid, MK
13:00-14:30	*Lunch*		
14:30-16:30	Valentin Mirceski (Skopje)	Electrochemical techniques for studying conducting polymers	Ohrid, MK
16:30-16:45	*Coffee Break*		
16:45-17:45	Rubin Gulaboski (Stip)	Voltammetry of conducting polymers	Ohrid, MK
Day 2			
09:00-10:00	Fetah Podvorica (Prishtina)	Electrografting of polymers onto material surfaces	Ohrid, MK
10:00-11:00	Blaga Radovanovic (Nis), Marjan Randjelcovic (Nis)	Investigation of rubber-filler interactions of nano- and micro-filled crosslinking polymer blends	Ohrid, MK
11:00-11:15	*Coffee Break*		
11:15-12:15	Dragan Djordjevic (Nis)	Geopolymers	Ohrid, MK
12:15-13:15	Luljeta Raka (Tetovo)	Sythesis, structure and properties of polypropylene/clay nanohybrids	Ohrid, MK
13:15-14:45	*Lunch*		
14:45-15:45	Gordana Bogoeva-Gaceva (Skopje, invited lecturer)	Interface in polymer composite materials	Ohrid, MK
15:45-16:45	Vineta Srebrenkoska (Stip)	Preparation and recycling of polymer eco-composites	Ohrid, MK
16:45-17:00	*Coffee Break*		
17:00-18:00	Vladimir Ivanovski (Skopje)	IR spectroscopy of polymers	Ohrid, MK
Day 3			
09:00-10:00	Muriel Hissler (Rennes, invited lecturer)	Synthesis of organic polymers for opto-electronic applications	Ohrid, MK

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Workshop "From Molecules to Functionalised Materials" – Ohrid, September 2014

EVALUATION RADIOCHEMICAL PURITY OF ^{177}Lu-LABELLED RITUXIMAB CONJUGATES USING HPLC METHOD

Marija Sterjova[1], Katarina Smilkov[1], Darinka Gorgieva-Ackova[1], Angela Carollo[2], Marco Chinol[2], Emilija Janevik[1]

[1]University Goce Delcev, Faculty of Medical Sciences, Stip, Republic of Macedonia
[2] Nuclear Medicine Division, European Institute of Oncology, Milano, Italy

In the field of radiolabelled molecules, Rituximab appear as promising molecules for radiopharmaceutical design, because it can target specifically to antigensin non-Hodgkin lymphoma.
In our project, Rituximab was conjugated with DTPA-, DOTA- and 1B4Mand prepared in a form of freeze dried kit formulation and labelled with ^{177}Lu used was 565 MBq (in 5 µL) per kit. The reaction mixture was incubated at 38^{0}C for 1 hour.

The radiochemical purity of the labeled conjugates was determined using SE-HPLC, Column BioSep-SEC-s3000 (300 x7.5 mm; Phenomenex), with flow rate 1ml/min, isocratic elution – eluent 0.1 M phosphate buffer pH 5.8, UV detection at 220 and 280 nm, analysis time ca. 20 min, sample volume: 20µl.

To around 10 µl of radiolabelled conjugate 10 µl of 10 mM DTPA solution was added in order to bind non-reacted ^{177}Lu. HPLC analysis was performed 5 min after DTPA addition using UV detection at 220 nm, 280 nm and radiometric detection.

^{177}Lu-Rituximab radioimunoconjugates with high radiolabelling yield and average of radiochemical purity (above 94.7%) and specific activity up to 1.5GBq/mg was obtained.
With the obtained results we can conclude that ^{177}Lu- Rituximab radioimunoconjugates can be used for development of the predclinical studies in experimental animal model.

Keywords: HPLC, 177Lu-Ab-DTPA, 77Lu-Ab-1B4M, 177Lu-Ab-DOTA