Dedication to Full Member of RAS Aslan Yusupovich Tsivadze on the Occasion of his 70th Birthday

Dear Readers!

This issue of the journal *Macroheterocycles* contains several papers dedicated to Professor Aslan Yusupovich Tsivadze, full member of Russian Academy of Sciences, director of A.N. Frumkin Institute of Physical Chemistry and Electrochemistry of Russian Academy of Sciences (IPCE RAS) on the occasion of his 70th birthday.

Aslan Tsivadze was born in Batumi in 1943. After graduation from the faculty of chemical technology of the Tbilisi polytechnical institute in 1967, he received his PhD degree in Chemistry in 1970 at N.S. Kurnakov Institute of General and Inorganic Chemistry of RAS (IGIC RAS). In 1979 he defended his habilitation thesis entitled "Spectrochemistry of metal amidocomplexes" and received the degree of Doctor of Chemical Sciences (inorganic chemistry). Since 2003 he is full member of Russian Academy of Sciences.

All his scientific and educational activity is devoted to chemistry. Since 1970 he started and developed his career in IGIC RAS from senior researcher to vice-director of the institute. The Laboratory of coordination chemistry of alkali and rare-earth metals was founded at IGIC RAS in 1981 under leadership of A.Yu. Tsivadze. The spectrochemistry of coordination compounds, chemistry and technology of crown-compounds as well as separation of isotopes became the main research directions of the laboratory. Since 2002 A.Yu. Tsivadze is the director of the Institute of Physical Chemistry of RAS, which was joined with the Institute of Electrochemistry in 2006 and became A.N. Frumkin Institute of Physical Chemistry and Electrochemistry of RAS. At present time A.Yu. Tsivadze is the deputy academician secretary of the Chemistry and Material Sciences branch of Russian Academy of Sciences. Over a long period of time A.Yu. Tsivadze was a member of the Presidium of D.I. Mendeleev Russian Chemical Society and he was elected as its President in 2012.

Academician A.Yu. Tsivadse is a well-known scientist in the coordination and supramolecular chemistry. He is the author of over 550 scientific publications, including 9 books, over 60 patents and 13 reviews. The scientific school of Aslan Yu. Tsivadze is recognized due to significant contribution to development of various modern research trends, i.e. synthesis and physico-chemical investigation of metal complexes of crown-ligands and other macrocyclic compounds, spectral conformational analysis of crown-compounds, extraction and separation of metal ions and their isotopes with application of crown-compounds, the development of synthetic approaches towards metal crown-phthalocyaninates and porphyrinates, investigation of supramolecular chemistry of macrocyclic heterotopic receptors, development of physico-chemical background of ion- and gas-selective sensors, electrochromic materials, materials for non-linear optics, photovoltaics and photorefraction.

A.Yu. Tsivadze has guided the development of the method of spectral conformational analysis of crown-compounds, which allowed determination of their structure in solution and solid state based on IR and Raman spectral data. Over 200 crown-compounds were synthesized and the trends of the conformational variation of these ligands upon metal coordination were revealed. The development of the conformational analysis and particularly the spectral conformational analysis allowed investigation of conformational peculiarities of crown-ligands with wide variety of metal complexes, induced by various factors (e.g. the influence of peripheral substituents, metal center, anions, solvents nature, etc). As a result, the new conformational principles of modification of macroheterocyclic compounds were developed, based of targeted alteration of the conformational equilibrium and thus the coordinating and ion-selective characteristics. The developed principles of the molecular stereo design of crown-compounds allow to perform the aimed search of the efficient extracting systems for separation of isotopes. New methods for separation of isotopes of lithium, magnesium, calcium and potassium with application of crown-compounds were developed. The physico-chemical fundamentals of environmentally benign,

energy-efficient technology for the separation of closely related compounds with application of crown-compounds are investigated.

The development of a new research area of coordination and supramolecular chemistry of macrocyclic compounds, entitled «Heterotopic tetrapyrrolic compounds – from synthesis towards materials» has become a significant point of career of academician A.Yu. Tsivadze. His scientific team has performed a comprehensive investigation of coordination and supramolecular chemistry of *p*-, *d*- and *f*-metals with crown-phthalocyanine ligands. The synthetic procedures for preparation of sandwich-type heteroleptic rare-earth bis- and trisphthalocyaninates, containing unsubstituted and crown-substituted phthalocyanine ligands, as well as porphyrin ligands are developed. These approaches for highly efficient synthesis of crown-phthalocyaninates present the fundamental basis for theory and practice of the targeted preparation of crown-phthalocyaninates with particular structure and thus tuning of their physico-chemical properties.

The systematic spectral investigation of cation-induced association of metal crown-phthalocyaninates allowed revealing the factors influencing the formation of supramolecular ensembles of various architectures. The obtained results are of significant value for practical application of crown-phthalocyaninates in modern technology. The revealed trends of supramolecular association of crown-phthalocyaninates allow controllable formation of the composites of various architectures, targeted to development of semiconducting materials, sensors, electrochromic and non-linear optical devices, ion-selective electrodes. The uncommon sodium-potassium selectivity of Co^{II} and Ru^{II} crown-phthalocyaninates is revealed, that allows detection of these cations in biological liquids upon joint presence. Supramolecular polymeric composites of Ru^{II} and Ga^{III} tetra-(15-crown-5)-phthalocyaninates demonstrate high values of third-order optical non-linearity and allow development of ultrathin photorefractive layers for amplification of signal beams of visible and NIR spectral regions. These layers are also prominent for telecommunication technologies and medical diagnostics. These investigations provide the technology of development of materials for optical computers, particularly for amplification of signal laser beams and also for creation of nonvolatile memory elements.

New principles for development of highly sensitive, stable, rapid and efficient molecular machines and switches are also developed under leadership of A.Yu. Tsivadze based on the nano-scale electromechanical systems ("nano-muscule"), constructed from lanthanide bis-crownphthalocyaninates. The found new synthetic approaches for synthesis of novel polyfunctional homo- and heteroleptic rare-earth metal complexes with macrocyclic tetrapyrrolic compounds allowed preparation of libraries for the development of molecular devices (nanosensors and elements of nanoelectronics) on their basis. The orientation-induced redox-switchable process, determined by controllable reversible electron transfer between ligand and metal center, is determined for the first time for cerium double-decker crown-phthalocyaninate.

The current studies, headed by A.Yu. Tsivadze, is devoted to innovative directions. The cathode ray conversion of associated petroleum gas, biomass and waste, the development of fuel cells and next generation lithium-ion accumulators, the development of new principles of OLEDs and solar cells, photorefractive materials, molecular switches and sensors, memory elements for molecular computers, sorption materials, etc. are under particular consideration.

The scientific achievements of A.Yu. Tsivadze are recognized by a set of State awards:

– First award of USSR Ministers council (New compounds and materials for electronics, 1975);

– State award of Russian Federation (Crown-compounds in chemistry and technology, 2000);

– Award of the Government of Russian Federation in science and technology (Tetrapyrrolic compounds for technical applications, 2002);

– L.A. Chugaev award for achievements in chemistry of coordination compounds (Metal complexes of crown-substituted phthalocyanine ligands, 2009);

– Award of Government of Russian Federation in education (Tutorial for high education institutions «Inorganic chemistry. Chemistry of elements», 2010).

He is also honored by the State award of Georgia (1998), Order of Friendship (2000), order of Honor (2008), Golden medal of the Italian Chemical Society (2009).

Academician A.Yu. Tsivadze is carrying out the active educational work and pays particular attention to engaging of talented youth to scientific research as well as development of education in general. He is the head of inorganic chemistry department in M.V. Lomonosov Moscow University of Fine Chemical Technology (MUFCT), professor of M.V. Lomonosov Moscow State University and D.I. Mendeleev University of Chemical Technology, honored professor of Taiwan Technological University. He supervised 23 PhD and 2 habilitation theses. He is the chairman of the Scientific Council on Physical Chemistry of Chemistry and Material Science branch of RAS, editor-in-chief of "Physical chemistry of surfaces and protection of materials" and "Corrosion: Materials, Protection" journals, member of editorial boards of "Russian Journal of Coordination Chemistry", "Russian Journal of Electrochemistry", "Chemical Engineering" and "Macroheterocycles", coordinator of basic research program "New approaches to amplification of resistance of materials towards corrosion and radiation", member of the Expert Council of the State Commission for Academic Degrees and Titles, member of dissertation councils of IPCE RAS, IGIC RAS and MUFCT, member of bureau of Directors board of RAS.

Since 1975 Aslan Yu. Tsivadze is an active organizer of D.I. Mendeleev Congresses on General and Applied Chemistry – the most valuable event in chemical science, technology, industry and education, being the general scientific secretary, vice-chairman of the organizing committee (2007) and chairman of the program committee

(2011). The conferences and scientific schools for young scientists on physical and coordination chemistry are organized annually under his leadership. Moreover, A.Yu. Tsivadze has headed the international organizing committee of 5th International conference on porphyrins and phthalocyanines (Moscow, 2008) with attendance of over 600 scientists from 43 countries.

A.Yu. Tsivadse scientific group actively participates in the international collaboration. He is leading the investigations of IPCE RAS in the framework of European research association "Supramolecular systems in chemistry and biology" («SupraChem» - 2005-2012), international projects ARCUS (Action en Region de Cooperation Universitaire et Scientifique) France (Burgundy) – Russia (2007-2011) and France (Alsace) – Russia – Ukraine (2007-2011). He is co-chairman of Russian-French laboratory LAMREM, «Laboratory of macrocyclic systems and related materials» (2011-2014) and SENA "Perspectives of separation of elements" (2010-2013).

We, all colleagues and friends of Professor Aslan Tsivadze, congratulate him with this Anniversary, and wish him a healthy, fruitful and long scientific life and many new scientific achievements and talented students.

Prof. Tsivadze – post-graduate student
at IGIC RAS

Prof. Tsivadze with colleagues
at IGIC RAS

Visit to University of Burgundy;
with scientific group of Prof. Roger Guilard
(Dijon, 2005)

Together with Acad. Boris F. Myasoedov
and Prof. Yulia G. Gorbunova
(Paris, 2005)

Laboratory anniversary
(IGIC RAS, Moscow, 2008)

II Russian-French Summer School
«Supramolecular Systems in Chemistry and Biology»
(Tuapse, 2008)

With Nobel Prize laureate Prof. Jean-Mary Lehn
(III Russian-French Symposium «Supramolecular Systems
in Chemistry and Biology», Moscow, June, 2005)

With Prof. Jean-Pierre Sauvage
(V International Conference on Porphyrins
and Phthalocyanines, ICPP-5, Moscow, July, 2008)

Opening ceremony of ICPP-5; with President and Vice-
President of Society of Porphyrins and Phthalocyanines Prof.
Karl Kadish and Prof. Roger Guilard (Moscow, July 2008)

Awarding from the Society of Porphyrins
and Phthalocyanines by Prof. Karl Kadish,
(Moscow, July 2008)

Signing of GDRI SENA agreement by direction of CNRS – Prof. Arnold Migus – CNRS General Director, Prof. Gilberte Chambaud – Director of Chemistry Department, Vladimir Mayer – Director of CNRS office in Moscow, Academ. Boris F. Myasoedov, (Moscow, 2009)

Signing of agreement with region of Burgundy; with Président du Conseil régional de Bourgogne - François Patriat (Dijon, 2009)

39th International Conference on Coordination Chemistry, ICCC39, with Prof. Pavel A. Stuzhin (Adelaida, Australia, July, 2010)

V International Conference on Porphyrins and Phthalocyanines; with Prof. Salome Rodriquez-Morgade, Prof. Tomas Torres, Mme M. Guilard and Prof. Roger Guilard (New Mexico, USA, July 2010)

VI Russian-French Symposium “Supramolecular Systems in Chemistry and Biology”; with Nobel Prize laureate Prof. Jean-Mary Lehn, Academ. A.I. Konovalov and Prof. A. Varnek (Strasbourg, September, 2012)

Mendeleev Congress; with Academ. V.V. Lunin, Academ. P.D. Sarkisov, Prof. M. Crossley, Prof. R. Guilard, Prof. T. Torres, Prof. N. Kobayashi, Prof. R. Pandey, Academ. S.M. Aldoshin, Academ. O.M. Nefedov and Governor of Volgograd Region A.G. Brovko – (Volgograd, September, 2011)

VI Russian-French Symposium “Supramolecular Systems in Chemistry and Biology”; Russian-Ukranian-French delegation (Strasbourg, September, 2012)

Together with Prof. Dan Shechtman (Nobel Prize 2011), Prof. V. M. Novotortsev and Prof. O. I. Koifman (from right to left)

Редакция журнала «Макрогетероциклы» сердечно поздравляет члена редакционного совета академика Аслана Юсуповича Цивадзе с 70–летним юбилеем и желает ему здоровья, успехов и процветания!

гл. редактор О. И. Койфман
зам. гл. редактора П. А. Стужин

