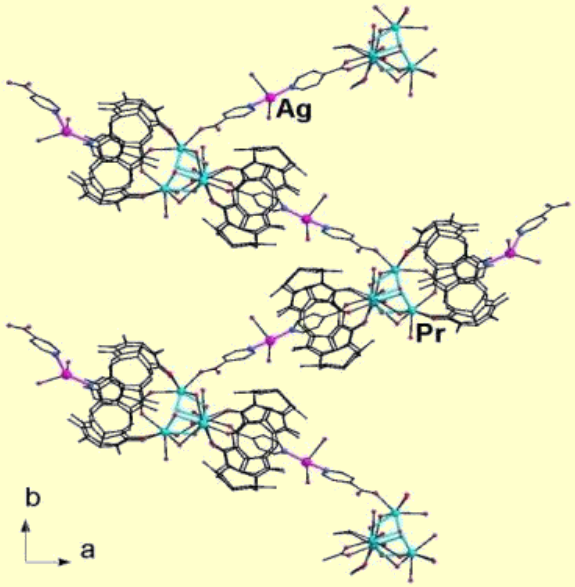
Scientific collaboration of the Nikolaev Institute of Inorganic Chemistry SB RAS with Germany

Karlsruhe, Germany
Karlsruher Institute für Tecnologie, Institut für Anorganische Chemie

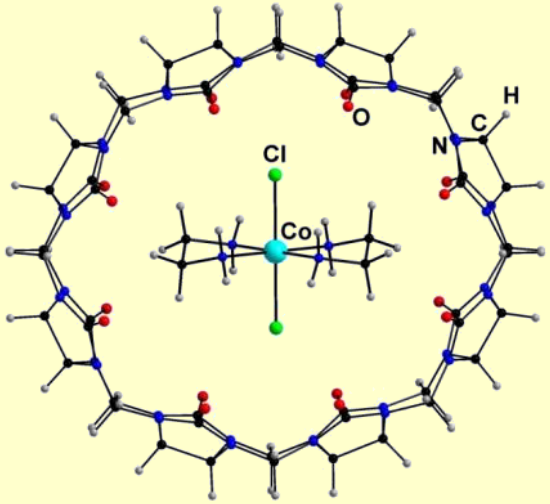
Prof. Dr. Dieter Fenske
Honorary doctor of NIIC

Cucurbiturils: metal complexes and inclusion compounds

complexes



inclusion compounds



Gerasko O. A., Mainicheva E. A., Naumova M. I., Neumaier M., Kappes M. M., Lebedkin S., Fenske D., Fedin V. P.
Sandwich-type Tetranuclear Lanthanide Complexes with Cucurbit[6]uril: from Molecular Compounds to Coordination Polymers
Inorg. Chem. 2008. P. 8869.

Mitkina T.V., Zakharchuk N.F., Naumov D.Yu., Gerasko O.A., Fenske D., Fedin V.P.
Synthesis, structure and electrochemical properties of inclusion compounds of cucurbit[8]uril with cobalt(III) and nickel(II) complexes
Inorg. Chem. 2008. P. 6748.

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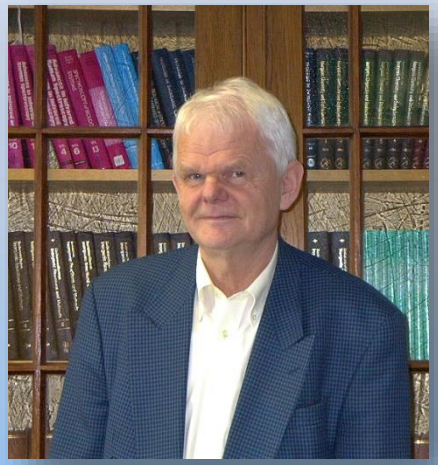
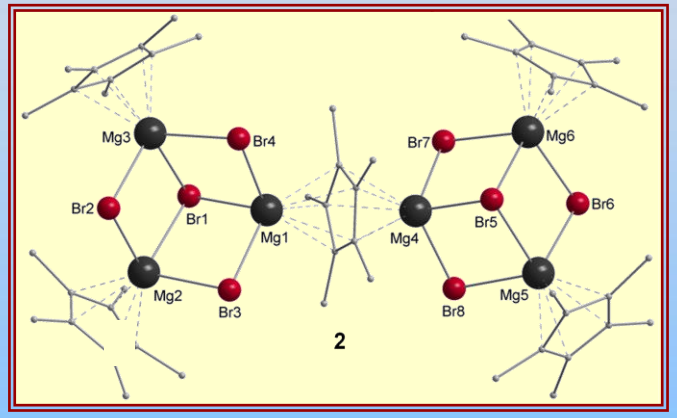
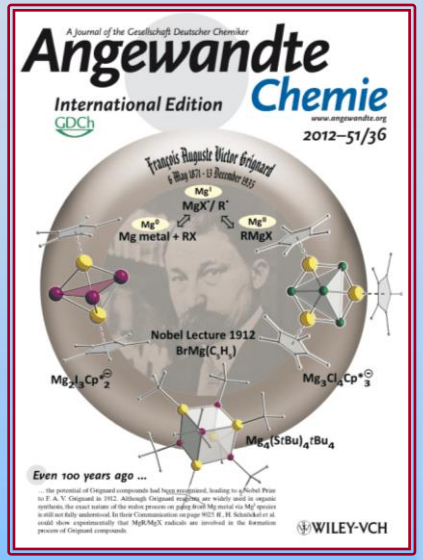


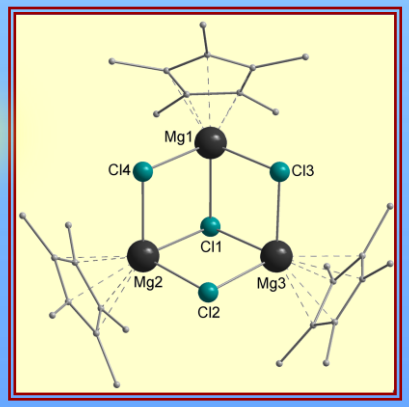
Prof. Dr. Hansgeorg Schnöckel

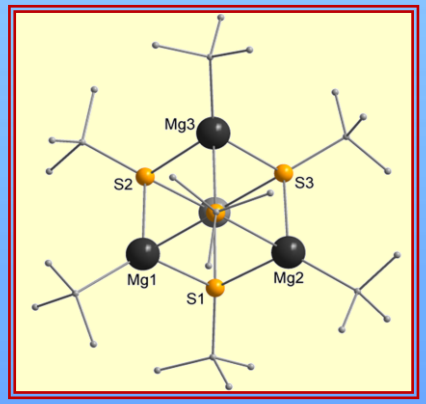
"Hunting" for Compounds of Main Group Elements in Unbelievable Oxidation State





Magnesium(I) compounds were unknown until 2007





Kruczyński T., Pushkarevsky N., Henke P., Köppe R., Baum E., Konchenko S., Pikies J., Schnöckel H.
Hunting for the Magnesium(I) Species: Formation, Structure, and Reactivity of some Donor-Free Grignard Compounds
Angew. Chem. Int. Ed. 2012. V. 51. P. 9025

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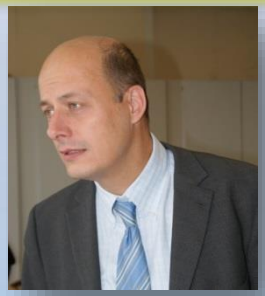
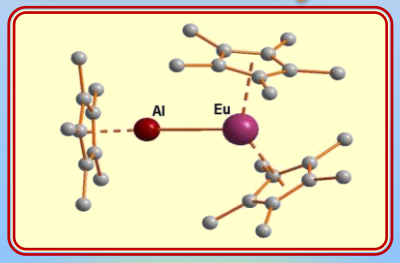
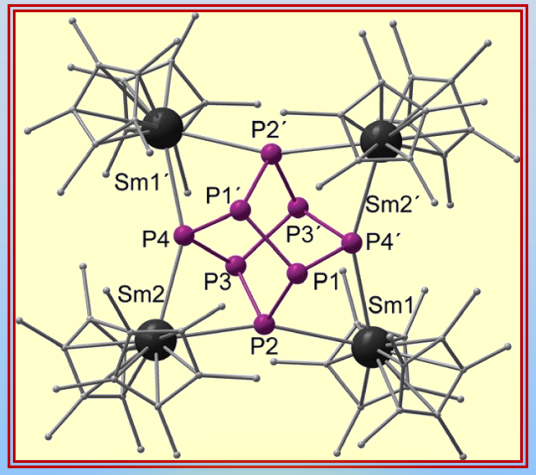


Prof. Dr. Peter Roesky

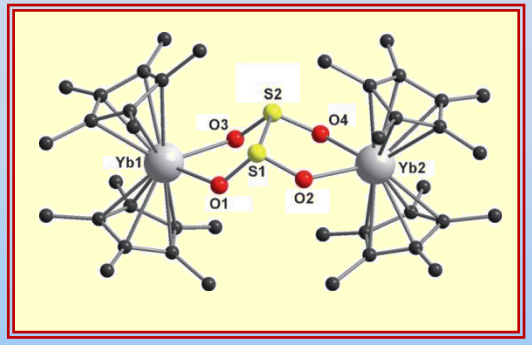
Synthesis and Reactivity of Unusual Lanthanide Complexes



Binding between such metals was considered to be impossible



The first molecular polyphosphide complex of lanthanide



The first example of SO_2 activation by lanthanide organometallics

Klementyeva S.V., Gamer M.T., Schmidt A.-C., Meyer K., Konchenko S.N., Roesky P. W. *Activation of SO_2 with [(η^5-$C_5Me_5)_2Ln(THF)_2$] (Ln=Eu, Yb) Leading to Dithionite and Sulfinate Complexes* **Chem. Eur. J., 2014, 20, 13497-13500.**

Konchenko S.N., Pushkarevsky N.A., Gamer M.T., Köppe R., Schnöckel H., Roesky P.W. *[{(η^5-$C_5Me_5)_2Sm$}$_4P_8$]: a molecular polyphosphide of the rare-earth elements* **J. Am. Chem. Soc., 2009, V. 131, P. 5740–5741.**

Wiecko M., Roesky P.W., Nava P., Ahlrichs R., Konchenko S.N. *Gallium(I)–alkaline earth metal donor–acceptor bonds* **Chem. Commun. 2007. N9. P. 927–929.**

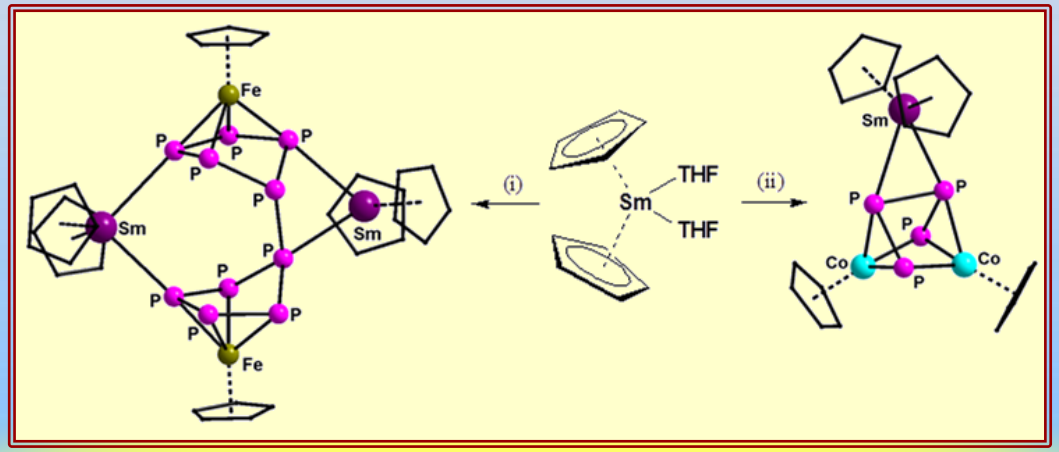
Gamer M.T., Roesky P.W., Konchenko S.N., Nava P., Ahlrichs R. *Al-Eu and Al-Yb donor-acceptor bonds* **Angew. Chem., Int. Ed. 2006. V. 45. № 27. P. 4447-4451.**

Karlsruher Institute für Tecnologie, Institut für Anorganische Chemie
Universitat Regensburg, Institut für Anorganische Chemie

Prof. Dr. M. Scheer

Prof. Dr. P. Roesky

Synthesis and Reactivity of Mixed *d*-, *f*- Metal Complexes



The polyphosphide units inside coordination sphere of *d*-metals undergo unusual transformations leading to unprecedented mixed-metal complexes

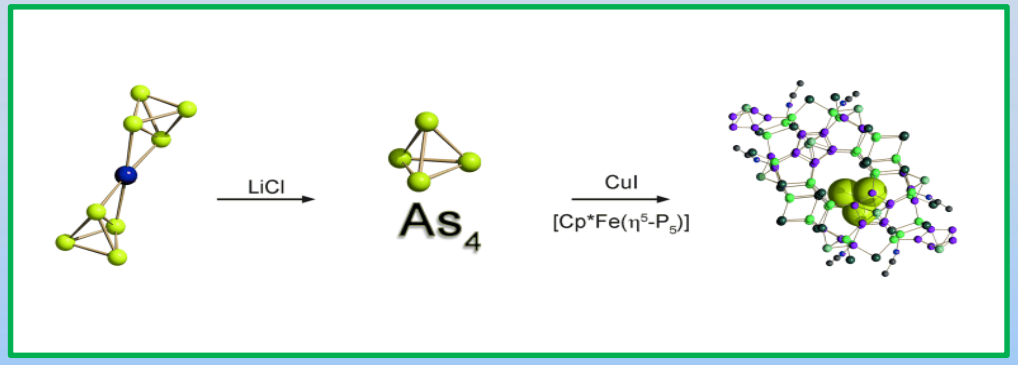
Arleth N., Gamer M.T., Pushkarevsky N.A., Konchenko S.N., Fleischmann M., Bodensteiner M., Scheer M., Roesky P.W. *4d/4f-Polyphosphides* **Chem. Sci. 2015, in press.**

Li T., Arleth N., Gamer M.T., Köppe R., Augenstein T., Dielmann F., Scheer M., Konchenko S.N., Roesky P.W. *Intramolecular phosphorus-phosphorus bond formation within a Co_2P_4 core* **Inorg. Chem., 2013, V. 52, № 24, P. 14231-14236.**

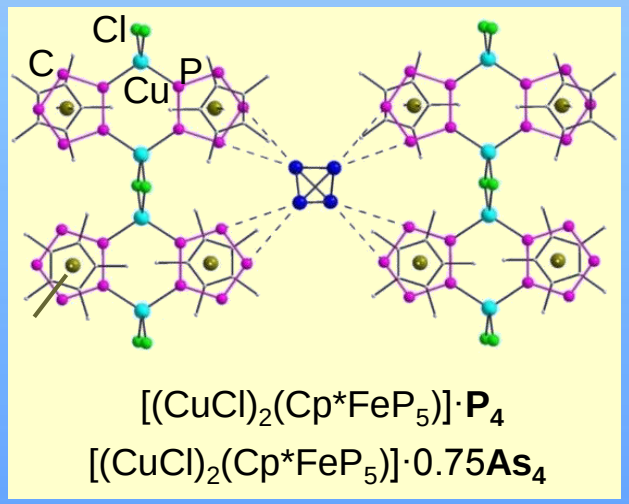
Li T., Gamer M.T., Scheer M., Konchenko S.N., Roesky P.W. *P–P bond formation via reductive dimerization of [Cp*Fe(η^5-P_5)] by divalent samarocenes* **Chem. Commun., 2013, V. 49, № 22, P. 2183-2185.**

Li T., Wiecko J., Pushkarevsky N.A., Gamer M.T., Köppe R., Konchenko S.N., Scheer M., Roesky P.W. *Mixed-metal lanthanide–iron triple-decker complexes with a cyclo-P_5 building block* **Angew. Chem. Int. Ed., 2011, V. 50, № 40, P. 9491-9495.**

Stabilization of Tetrahedral P_4 and As_4 Molecules as Guests in Polymeric and Spherical Environments

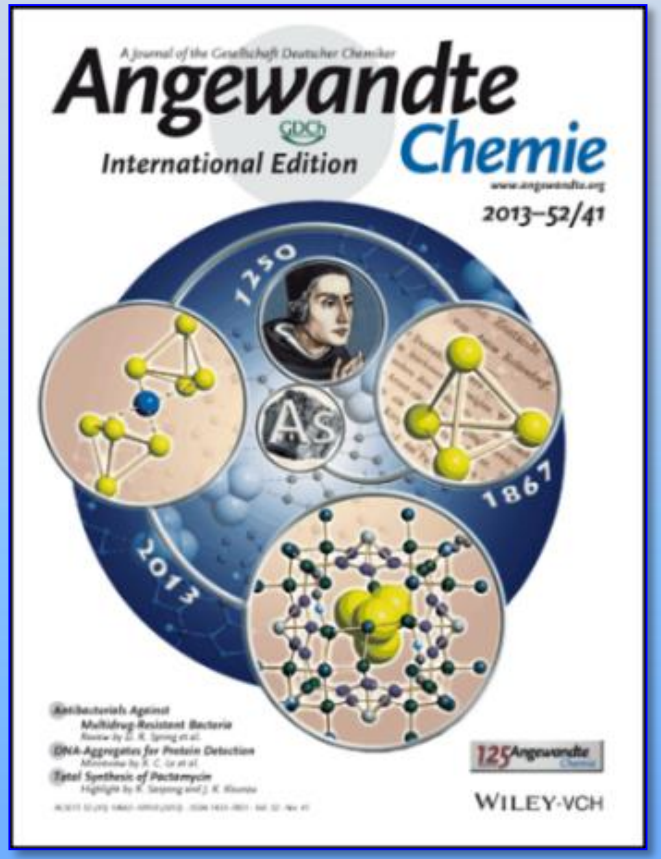


The As_4 tetrahedron encapsulated in an ellipsoid shaped host molecule of $[Cp^*Fe(\eta^5\text{-}P_5)]$



$[(CuCl)_2(Cp^*FeP_5)]\cdot\mathbf{P_4}$

$[(CuCl)_2(Cp^*FeP_5)]\cdot 0.75\mathbf{As_4}$

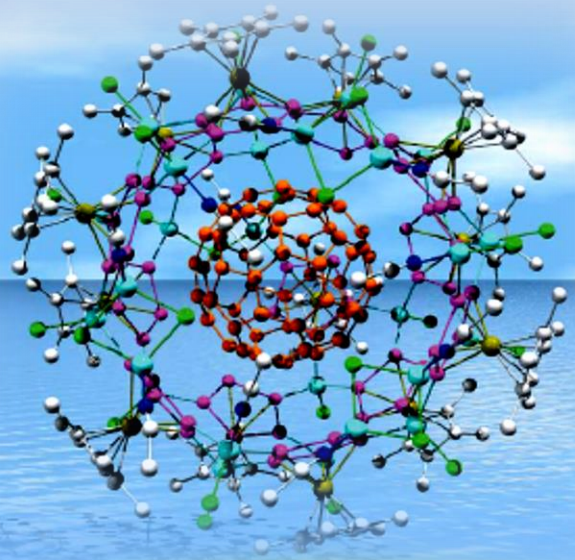


Schwarzmaier C., Schindler A., Heindl C., Scheuermayer S., Peresypkina E.V., Virovets A.V., Neumeier M., Gschwind R., Scheer M. *// Angew. Chem. Int. Ed.* **2013, 52, 10896. IF = 13,734**

Regensburg, Germany
Universitat Regensburg, Institut für Anorganische Chemie

Prof. Dr. Manfred Scheer
Honorary doctor of NIIC

$C_{60}\subset[Cu_{26}Cl_{26}(H_2O)_2\{Cp^*Fe(\eta^5\text{-}P_5)\}_{13}(NCMe)_9]$



Inclusion of Fullerene-60 molecule (orange balls)
into Fe/Cu polyphosphide cage

M. Fleischmann, S. Welsch, H. Krauss, M. Schmidt, M. Bodensteiner, E. Peresypkina, M. Sierka, C. Gröger, M. Scheer **Complexes of Monocationic Group 13 Elements with Pentaphospha- and Pentaarsaferrocene** // Chemistry - A European Journal (2014) V. 20, p. 3759-3768**.**

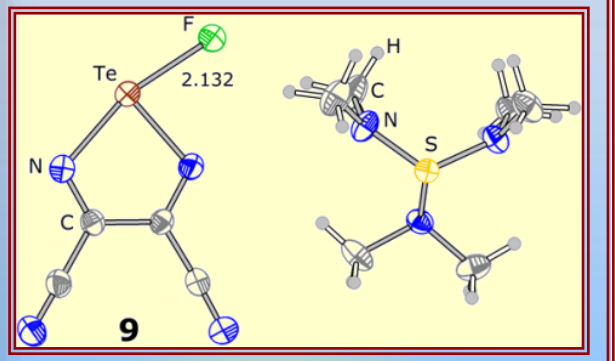
E. Mädl, M. V. Butovskiy, G. Balázs, E. Peresypkina, A. V. Virovets, M. Seidl, M. Scheer. **Functionalization of the cyclo-P_5 ligand in pentaphosphaferrocene by main group nucleophiles** // Angew. Chem. Int. Ed. 2014, 53, p. 7643-7646**.**

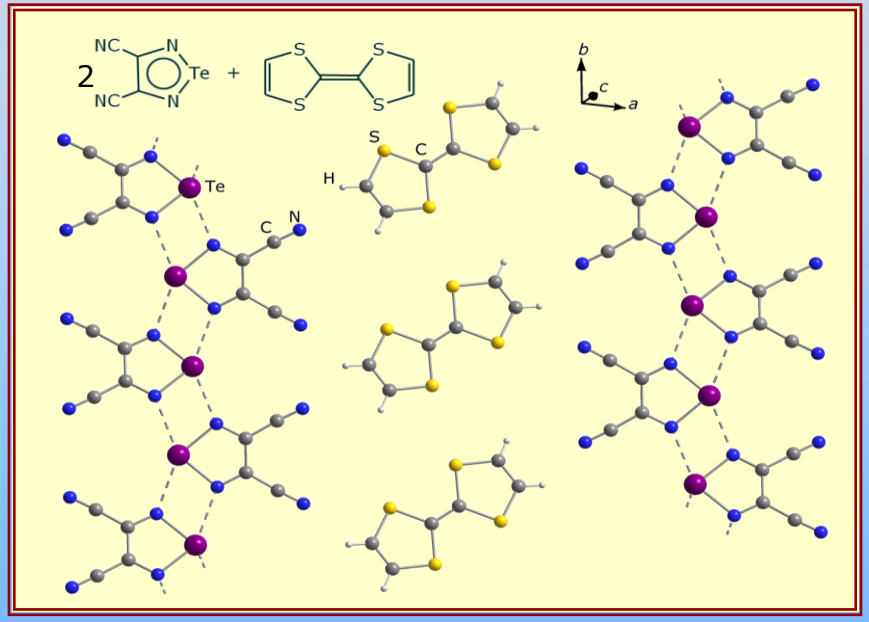
Bremen, Germany
Universität Bremen, Institut für Anorganische Chemie

Universität Bremen

Main group chemistry, including heavy-element heterocycles, radical-anions and charge-transfer complexes

Prof. Dr. Jens Beckmann





Novel coordination chemistry

new bonding types

low band gap semiconductors

N. A. Semenov, N. A. Pushkarevsky, J. Beckmann, P. Finke, E. Lork, R. Mews, I. Yu. Bagryanskaya, Yu. V. Gatilov, S. N. Konchenko, V. G. Vasiliev, A. V. Zibarev

Tellurium-nitrogen π-heterocyclic chemistry: synthesis, structure and reactivity toward halides and pyridine of 3,4-dicyano-1,2,5-telluradiazole

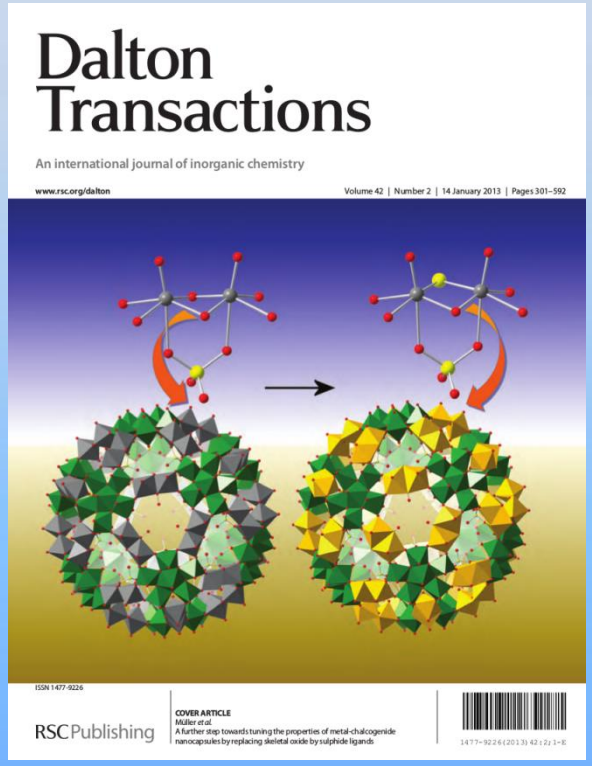
Eur. J. Inorg. Chem., 2012, p. 3693–3703

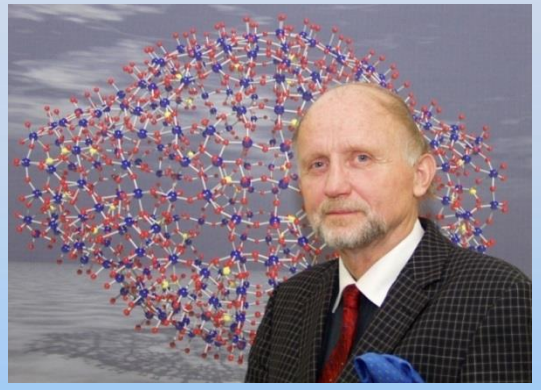
N. A. Pushkarevsky, A. V. Lonchakov, N. A. Semenov, E. Lork, L. I. Buravov, L. S. Konstantinova, G. T. Silber, N. Robertson, N. P. Gritsan, O. A. Rakitin, J. D. Woollins, E. B. Yagubskii, J. Beckmann, A. V. Zibarev

First charge-transfer complexes between tetrathiafulvalene and 1,2,5-chalcogenadiazole derivatives: design, synthesis, crystal structures, electronic and electrical properties

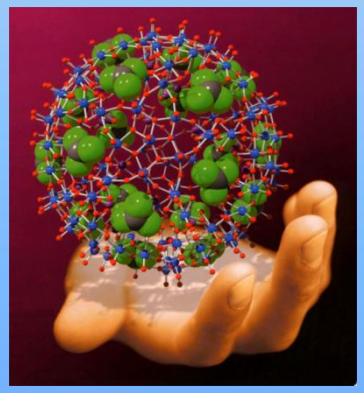
Synthetic Met., 2012, v. 162, p. 2267–2276

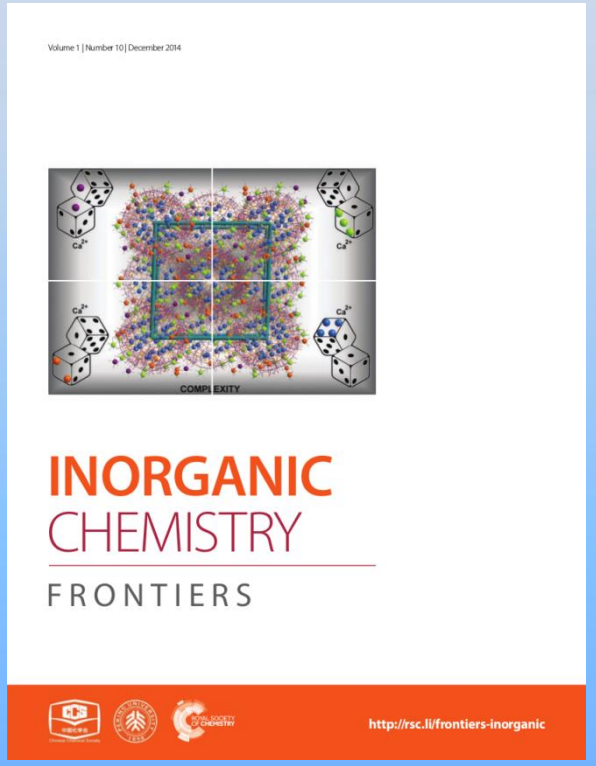
Bielefeld, Germany
Fakultat fur Chemie, Universitat Bielefeld





Prof. Dr. Achim Müller





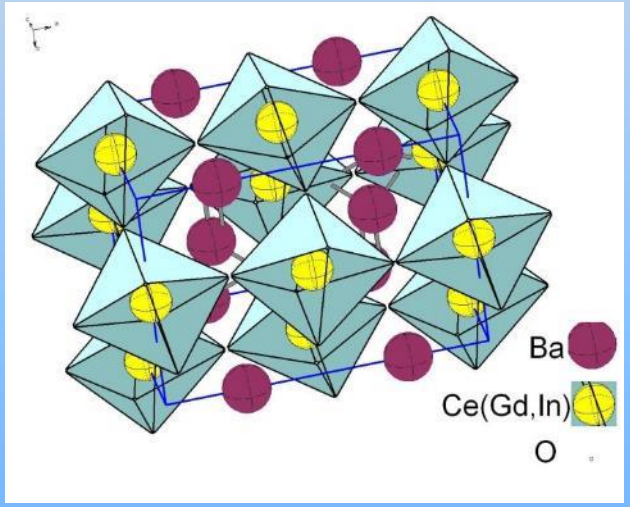
C. Schäffer, A.M. Todea, H. Bögge, S. Floquet, E. Cadot, V.S. Korenev, V.P. Fedin, P. Gouzerh, A. Müller
A further step towards tuning the properties of metalchalcogenide nanocapsules by replacing skeletal oxide by sulphide ligands
Dalton Trans. 2013. 42. 330-333.

M. Rubčić, V.S. Korenev, L. Toma, H. Bögge, V.P. Fedin, A. Müller
Molecular recognition of Ca^{2+} cations by internal and external receptors/interfaces in a spherical porous molybdenum-oxide capsule: unusual coordination scenarios
Inorg. Chem. Front. 2014. 1. 740–744.

Karlsruhe, Germany
Karlsruher Institute für Tecnologie

Synthesis and thermochemical characteristics of a highly stable $BaCe_{0.7}Gd_{0.2}In_{0.1}O_{2.85}$

For the first time substituted by gadolinium and indium barium citrate prepared by solid phase synthesis



Perspective proton conductor for fuel cells, sensors and ceramic membranes

Solution calorimetry method

$BaCe_{0.7}Gd_{0.2}In_{0.1}O_{2.85}$:

- ✓ thermodynamically is stable with respect to decay into binary oxidesтермодинамически
- ✓ more stable than the phases: $BaCe_{0.7}Nd_{0.2}In_{0.1}O_{2.85}$, and $BaCe_{0.8}Nd_{0.2}O_{2.9}$

Expansion of the solubility limit by introducing indium increases the number of protons defects and stability of compounds

Matskevich N.I., Matskevich M.Yu., Wolf Th., Bryzgalova A.N., Chupakhina T.I., Anyfrieva O.I. *//J. Alloys Comp.* **2013. V.577. P. 148-151. IF = 2.390**

Honorary doctors of the Institute

Prof. Dr. Manfred Scheer,
Professor and Chair of Inorganic Chemistry,
University of Regensburg

Prof. Dr. Dieter Fenske, Karlsruhe, Germany
Universität Karlsruhe (TH) Institut Für Anorganische Chemie

Awards for young researchers

- ✓ Alexander von Gumbold Foundation
- ✓ DAAD, Deutscher Akademischer Austausch Dienst (4 grants)
- ✓ DFG, Deutsche ForschungsGemeinschaft (more than 15 grants)