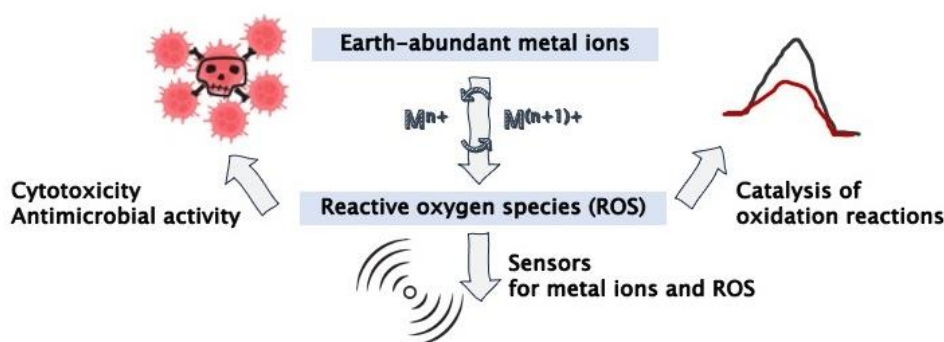


Earth-abundant metals for applications in medicine and catalysis

Description

The research group of Prof. Nora Kulak develops metal-based compounds for applications in medicine and catalysis. In comparison to organic substances, metal complexes are structurally more versatile and have a rich redox chemistry. The focus is on earth-abundant metals rather than precious metals for several reasons: higher availability, lower price, and their production from ores has a lower CO₂ footprint.



Redox active metals can generate reactive oxygen species (ROS) when reacting with molecular oxygen or promoted by light exposure. On the one hand, these are used for the degradation of biomolecules, and thus for killing cancer cells and bacteria. On the other hand, catalytic systems for oxidation reactions based on metal-initiated ROS formation are being developed. Sensors are developed for the detection of metal ions as well as ROS.

Details

- Synthesis and characterization of earth-abundant metals
- Testing of biological activity at the molecular level (interaction of metal complexes with DNA and proteins)
- Testing of catalytic performance in oxidation reactions
- Sensing of (alkali) metal ions and ROS

Methods

- Organic synthesis of ligands and fluorescent dyes, solid phase peptide synthesis (SPPS), synthesis of transition metal complexes
- Various techniques of spectroscopy (IR, fluorescence, UV/VIS, EPR, circular dichroism) and electrochemistry (cyclic voltammetry, potentiometry, spectroelectrochemistry)
- Elemental analysis (AAS, ICP-OES, ICP-MS)
- HPLC (semi-preparative and analytical)

References

- T. Skorjanc, N. Kulak *et al.*, *ACS Appl. Nano Mater.* **2023**, *6*, 21161-21168.
- S. Doniz Kettenmann, N. Kulak *et al.*, *ChemMedChem* **2022**, *17*, e202100702.
- J. Heinrich, N. Kulak *et al.*, *Chem. Eur. J.* **2021**, *27*, 18093-18102.
- S. Lechnitz, J. Heinrich, N. Kulak, *Chem. Commun.* **2018**, *54*, 13411-13414.

Applications

- (Green) Catalysis
- Metals in Medicine
- Sensors for metal ions
- Sensors for reactive oxygen species

Keywords

- Oxidation catalysis
- Reactive oxygen species
- Metal complexes
- Sensors

Interest in cooperation

- Research-based collaboration
- Contract research
- Industry-sponsored research

Contact

Transfer Service

Tel: +49 (0)331 / 977 61 71

Fax: +49 (0)331 / 977 38 70

tech@potsdam-transfer.de

Potsdam Transfer

Center for start-ups, innovation & transfer of knowledge and technology

Karl-Liebknecht-Straße 24–25,
Haus 29

14476 Potsdam

www.potsdam-transfer.de

Date Oct. 2024