XV International Symposium on Inorganic Biochemistry

New Arrivals on Stage

Book of Abstracts

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Dear Friends and Colleagues,

It is our great pleasure to welcome you to Wrocław for the XV International Symposium on Inorganic Biochemistry (ISIB). The 2025 edition proudly continues the tradition of the previous symposia, which began 40 years ago in Karpacz, thanks to the vision and efforts of Professor Henryk Kozłowski.

Over the years, the fourteen preceding meetings have been a remarkable success, bringing together leading researchers from around the world. They have focused on key areas at the intersection of inorganic, coordination, and bioinorganic chemistry with biology and medicine. Among the central topics have been chemical structure and thermodynamics, solution equilibria and metal–biomolecule interactions, transport, homeostasis and toxicity of metals in disease, as well as the development of metal-based therapies and diagnostics.

This year's symposium continues this mission, offering a forum for valuable discussions on recent advances in these areas. Alongside plenary and invited lectures, participants will have the opportunity to share their work through flash presentations and poster session. We believe that the scale of this year's meeting—around 80 participants, reflecting the 80th birthday of Professor Henryk Kozłowski—will encourage informal and stimulating exchanges between experienced scientists and younger colleagues. Promoting new collaborations among researchers with complementary expertise and goals is one of our key ambitions.

This year, under the subtitle "New Arrivals on Stage", we are delighted to welcome a number of first-time speakers to the ISIB community, while also expressing our gratitude to our long-standing friends whose continuous support has sustained the symposium for many years.

We are truly happy to host you in Wrocław.
Let us enjoy the science together!

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Microplusin: a strong copper-chelating and effective antimicrobial, natural peptide

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Nowadays, the phenomenon of antimicrobial resistance is a serious public health challenge. The emergence of strong resistance mechanisms among bacteria is rendering many diseases difficult to treat, consequently diminishing the efficacy of previously effective drugs. One of the main aims of researchers is to identify and design novel drugs effective against pathogens. Among potential candidates, antimicrobial peptides (AMPs) represent a very interesting substrate for drug design due to their broad spectrum of activity, different mechanisms of action and low propensity to induce antimicrobial resistance. Natural AMPs are abundant across all kingdoms of life; microplusin is a representative example.

Microplusin is an antimicrobial peptide isolated from the thick *Rhipicephalus microplus*. Structurally, microplusin consists of five α-helices with disordered N- and C-termini. It contains six cysteine residues forming three disulfide bonds and a histidine-rich region in both the N- and C-terminal domains [1]. This peptide shows a broad spectrum of activity, being efficacy against Gram-positive and Gram-negative bacteria, fungi and yeast at micromolar and submicromolar concentrations [2].

Different studies indicate that while microplusin does not disrupt bacterial membranes, it acts as a potent chelator of copper ions. The ability of an AMP to chelate metal ions can confer an antimicrobial effect by sequestrating these essential micronutrients from the surrounding environment, thereby depriving pathogens of nutrients for their survival and growth. This mechanism is known as “nutritional immunity”. Furthermore, microplusin has been shown to negatively affect cellular respiration in *Micrococcus luteus,* most likely through the removal of copper ions from heme-copper terminal oxidases [3].

We decided to study short fragments of this protein, corresponding to the N-terminal (HHQEL) and C-terminal (DPEAHHEHDH) domains. Both terminal sequences are unfolded and rich in histidine residues and lie on the same side of the structure. Previous NMR studies suggest a preferred binding site in the N-terminus, however an unequivocably determination of the binding residues has not been obtained and the bioinorganic chemistry of microplusin still remains unravelled. By means of different experimental techniques (mass spectrometry, potentiometry, UV-Vis spectrophotometry and circular dichroism) we have characterized the formed copper complexes with the selected fragments and compared the Cu(II) binding behavior of the two putative N- and C- terminal sequences of microplusin.

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based on metal complexes with peptide derivatives: synthesis, characterization and potential biological applications") is gratefully acknowledge.

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