Structural chemistry
• Inorganic chemistry
• Crystal engineering
• Periodic quantum mechanical computations
• Single crystal X-ray diffraction
• Powder diffraction
• Rietveld analysis

Research equipment
• Gemini A Ultra X-ray Diffraction System from Agilent Technologies
• Seifert HZG-4 Diffractometer for powder diffraction measurements
• High Pressure and High Temperature Equipment

Collaboration
Center for Advanced Radiation Sources, The University of Chicago (USA) – Yu-Sheng Chen
Faculty of Chemistry, Adam Mickiewicz University (Poland) – Andrzej Katrusiak
Organometallic Synthesis Laboratory, Faculty of Chemistry, University of Warsaw (Poland) – Andrzej Katrusiak,
Faculty of Chemistry, Rzeszow University of Technology (Poland) – Jan Kalembkiewicz

Current research
• Structural chemistry of lithium, sodium and magnesium salts and electrolytes for the use in rechargeable batteries
• The hierarchy of intermolecular interactions in crystal structures of boronic acids, their derivatives and co-crystals
• Structural, electronic and energetic studies of arsenic(III) oxide polymorphs and intercalates
• Structural studies of organometallic compounds containing main-group and transition metals
• Development of bond-valence vector model

Selected publications
Zachara J., Novel Approach to the Concept of Bond-Valence Vector, Inorganic Chemistry, 46(23), 11610, 2007

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