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Prof. Dr. Miriam M. Unterlass (Fraunhofer Institute for Silicate Research, Würzburg; Julius Maximilian University of Würzburg)
Exploring the Chemical Space for Green and Sustainable Materials

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Prof. Dr. Miriam M. Unterlass

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Our modern lifestyle is unthinkable without chemical products. At the same time, their synthesis poses enormous challenges to our planet's environment and climate. The central hypothesis of our research is that water, H_2O, can be tuned to be a near-universal solvent for the synthesis and processing of chemical compounds. This hypothesis is backed by geological evidence across all classes of chemical compounds forming in the Earth's crust in aqueous environments. In this seminar, I will discuss the physicochemical features of liquid H_2O as a potent medium for chemical synthesis. Furthermore, I will discuss examples of materials synthesis and processing across a wide range of molecular architectures (small molecules, polymers, networks), order (amorphous, crystalline, semicrystalline, mesocrystalline), types of bonding (covalent, metallic, ionic), and chemical nature (organic, inorganic, hybrid). Furthermore, I will discuss how the to date still essentially untapped chemical space can be explored through combining hydrothermal and automation approaches, while capitalizing upon the sustainability aspects of water-based chemical synthesis and processing.