**Modification of dielectric properties in selected inorganic-organic hybrid compounds under high-pressure conditions**

**Keywords:** hybrid inorganic-organic compounds, broadband dielectric spectroscopy, phase transition, molecular dynamics, relaxation process

**Abstract:**

Nowadays, hybrid inorganic-organic compounds have emerged as a fast-developing and promising class of chemical substances. They incorporate both inorganic and organic constituents, chemically bonded into a crystalline porous one-phase structure. Due to the ease of modifying their inorganic and organic building blocks, these materials offer unlimited opportunities to tune their physicochemical properties, including the dielectric ones. Although the hybrid compounds were thoroughly studied at ambient pressure, the field of their dielectric properties under high-pressure conditions remains almost unexplored. Therefore, this dissertation aims to determine the influence of external hydrostatic pressure on the dielectric properties of selected representatives of hybrid inorganic-organic compounds. To that end, five hybrids were investigated by means of broadband dielectric spectroscopy over a wide temperature-pressure range, i.e., formamidinium manganese(II) formate, acetamidinium manganese(II) formate, 1,4-diaminobutane zinc formate, bis(methylhydrazinium) lead tetrabromide, and bispyrrolidinium potassium hexacyanidocobaltate(III). These compounds belong to the three most important families of hybrids (formates, halides, and cyanides). Moreover, they are characterized by rich structural and dielectric features, such as double- or multi-phase nature, anisotropy, ferroelectricity, relaxation phenomena, and dielectric switching between high (ON) and low (OFF) dielectric states. Consequently, this dissertation thoroughly discusses the pressure impact on the phase transition temperature, structural disorder, dynamics of reorienting moieties, and their behavior under various pressure-temperature phase transition conditions. It is shown that all these features are significantly modified even in a low-pressure range. Thus, the observed effects point that temperature and pressure are two important variables in controlling the dielectric properties of inorganic-organic hybrid compounds. In this context, the utility of pressure in controlling and accelerating the dielectric switching process between OFF and ON states is shown for switchable dielectrics. Finally, this dissertation deals with the impact of mechanical stresses generated in a material by the applied pressure on this physical process.