

The effect of high-pressure on functional ABO_3 perovskite-type oxides

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The understanding of ABO_3 perovskite is one of the most challenging topics at the interface between solid state chemistry and solid state physics. In particular, the understanding of phase transitions induced by external parameters like temperature, pressure, strain, magneto-electric fields etc. remains of great interest. Compared to temperature, the external parameter high pressure is of particular interest since it acts only on interatomic distances and can be much easier simulated by potentially insightful ab-initio calculations.

In our presentation we will first recall the perovskite structure and the relation between different structural distortions and physical properties. We will then discuss the historic and famous rules of Samara [1] which have guided for years the interpretation of the effect of high-pressure on perovskites. In the second part of the talk we will present observations by high-pressure Raman scattering and synchrotron scattering experiments on perovskite-type and nano-structured relaxor ferroelectrics [2-7]. We will namely show and discuss that their local *and* average structure is fundamentally modified under high-pressure, what is in sharp contrast to the effect of temperature, which is known to lead generally to only small evolutions in the average structure of relaxors. We will finally discuss recent findings [8-13] which challenge Samara's longstanding rules for some specific perovskites and which have led to new fundamental insight into the structural physics of perovskite-type oxides. All along the presentation a main emphasis will be put on the importance of using Raman and synchrotron scattering in a complementary way.

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