

Beyond Classical Fields: Some Aspects of Modern Applied Mineralogy and Crystallography

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For many decades classical mineralogical tools such as chemical analysis, microscopy, X-ray diffraction, thermal analysis or spectroscopic methods were used intensely for the characterization of minerals but also for analysis of synthetic materials relevant in material science. For a long period classical materials such as glasses or ceramic compounds, coal or steel were the representatives of applied mineralogy in industry. The profound knowledge of both materials properties and a broad variety of analytical methods are an excellent combination for a comprehensive characterization in materials sciences.

With shortage of natural resources and demand for more and more specialized compounds, traditional mineralogical and crystallographic tools have been expanded to new research areas. Nowadays, mineralogical techniques are well established in pharmaceutical industry especially for the detection of polymorphism. They are also essential for the characterization of new catalytic active compounds such as synthetic spinels, perovskites, metal oxides, or zeolites. The development of novel types of carbon and silica materials with unique physical and chemical properties gives access for new applications. Superconductors, electrode materials or biomaterials are some more examples which are investigated in detail by means of classical mineralogical tools. One of the major challenges in materials science is the development of reversible solid state hydrogen storage materials for fuel cells. Since the storage properties of these solids are directly correlated to their crystal structures, crystallographic investigations are compulsory. Only the combination of intelligent synthesis strategies, different analytical techniques and new approaches of *in situ* investigations allow detailed insights into new and fascinating classes of materials.

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Abs. No. **228**

Meeting: **DMG 2008**

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date: **2008-05-30**

Req. presentation: **Vortrag**

Req. session: **S16**