

News from defects in SrTiO₃ and their interaction with light

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Defects in metal oxides are of major importance in several fields of materials science and investigated since several decades. However, despite the substantial knowledge gained so far on model oxide materials such as SrTiO₃ (having a band gap of about 3 eV), research activities can still reveal surprising novel phenomena or experimental results. Examples of such unexpected defect-related effects in SrTiO₃ are discussed in this talk. First, it is shown that pulsed laser deposited doped SrTiO₃ thin films may behave as if they were intrinsic, i.e. ultra-pure, with extremely high resistivities even at rather high temperatures. The role of cation non-stoichiometry is discussed. Second, the effect of (UV)-illumination on the bulk properties of SrTiO₃ is considered: A light induced stoichiometry change manifests itself in photochromism, conductivity changes and oxygen chemical potential changes. The latter may cause a battery-type EMF in a solid state electrochemical cell, i.e. a kind of photo-charging of an oxygen battery. Finally, it is shown that LaCrO₃/SrTiO₃ hetero-junctions enable fabrication of high temperature solar cells with cell voltages of almost 1 V at 350°C.