Dopant Incorporation in proton conducting perovskites

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Rare earth doped BaCeO3 is well investigated as a good proton conducting perovskite but the site incorporation of M3+ dopant ions is still a critical question unsolved. For charge balance reasons, incorporation onto the A-site requires the creation of negatively charged point defects whereas incorporation onto the B-site is accompanied by positively charged defects such as oxygen vacancies. Oxygen vacancy content, in turn, is particularly relevant to proton conducting oxides in which protons are introduced via the dissolution of hydroxyl ions at vacant oxygen sites. Thus the M3+ dopant site directly affects the transport property of the system. In this work we present the results of ALCHEMI (Atom Location by CHanneling Electron MIcroanalysis) and EMP (Electron Microprobe) investigations of the dopant incorporation mechanism in BaxCe0.85M0.15O3, where M=Nd, Gd, Yb and x ranges from 0.85 to 1.20.