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Crystal Chemistry and Physics of Perovskites with Small Cations at the A Site

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Synthesis, crystal chemistry, and physics of perovskites with small cations at the A site are an emerging field in perovskite science. Properties of ABO₃ perovskites with small cations at the A site (A = Sc and In; B = transition metals) will be reported. ScBO₃ and InBO₃ perovskites extend the corresponding families of perovskites with A = Y, La-Lu, and Bi and exhibit larger structural distortions. As a result of large distortions, they show, in many cases, distinct structural and magnetic properties. It is manifested in B-site-ordered monoclinic structures of ScMnO₃ [Inorg. Chem. 52 (2013) 9692] and 'InMnO₃' [Angew. Chem.: Inter. Ed. 49 (2010) 7723]; an unusual superstructure of ScRhO₃ and InRhO₃ [Inorg. Chem. 52 (2013) 12005]; two magnetic transitions in ScCrO₃ and InCrO₃ with very close transition temperatures [Chem. Mater. 24 (2012) 2197]; and antiferromagnetic ground states and multiferroic properties of Sc₂NiMnO₆ and In₂NiMnO₆ [Inorg. Chem. 52 (2013) 14108]. Features of such perovskites, such as, transition metal doping into the A site, (Sc_{1-x}B_x)BO₃, will be discussed. Special attention will be given to new spin-driven multiferroics Sc₂NiMnO₆ and In₂NiMnO₆.

Keywords: Multiferroics, High-pressure synthesis, Perovskites