

Discovery of novel post-perovskites by high pressure methods. Martin Bremholm,^{ab} S. E. Dutton,^{bc} P. W. Stephens^d, R. J. Cava,^b ^a*Dept. of Chemistry, Aarhus University, Denmark,* ^b*Dept. of Chemistry, Princeton University, USA,* ^c*Cambridge University, England,* ^d*Department of Physics, SUNY, Stony Brook NY, USA*
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We have prepared a novel post-perovskite, NaIrO₃, by high pressure solid state synthesis and recovered it to ambient conditions [1]. Among the few known oxide post-perovskites, NaIrO₃ is the first example with a pentavalent cation. The structure consists of layers of corner- and edge-sharing IrO₆ octahedra separated by layers of NaO₈ bicapped trigonal prisms. NaIrO₃ shows no magnetic ordering and resistivity measurements show non-metallic behaviour. The crystal structure, electrical and magnetic properties are discussed and compared to known post-perovskites and pentavalent perovskite metal oxides.

In 2004 two groups independently discovered a high pressure transition at 125 GPa in MgSiO₃ from a perovskite to a post-perovskite structure [2,3]. The transition is believed to explain the observed transition in the speed of sound in the Earth's lower mantle and it is of high importance in seismology. Considering the extreme pressure required to study MgSiO₃ there is a great interest in discovering analog compounds which are stable at lower pressures. The recent discoveries of several new oxide post-perovskites have also sparked interest in the materials science community regarding their electronic and magnetic properties. The interest is further invigorated by the valence flexibility of the cations allowing mixed valence and tuning of properties.

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