FERROIC ORDERS AND THEIR COUPLING IN LAYERED, PEROVSKITE-RELATED OXIDES

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The compositional flexibility of perovskite oxides makes them a hugely important family of functional materials. The perovskite-related phases, including Aurivillius, Ruddlesden-Popper, Dion-Jacobson and brownmillerites, retain some of this flexibility but their layered nature gives added potential, enhancing some of their properties[1] but also allowing different mechanisms to be exploited in designing functional materials.[2]

This talk explores the balance between polar and antipolar phases in several families including Aurivillius,[3] $A_4B_3O_9$ phases[4] and brownmillerite materials,[5] (see figure) the forces that stabilise these different phases, the coupling between ferroic orders and the consequences for physical properties.

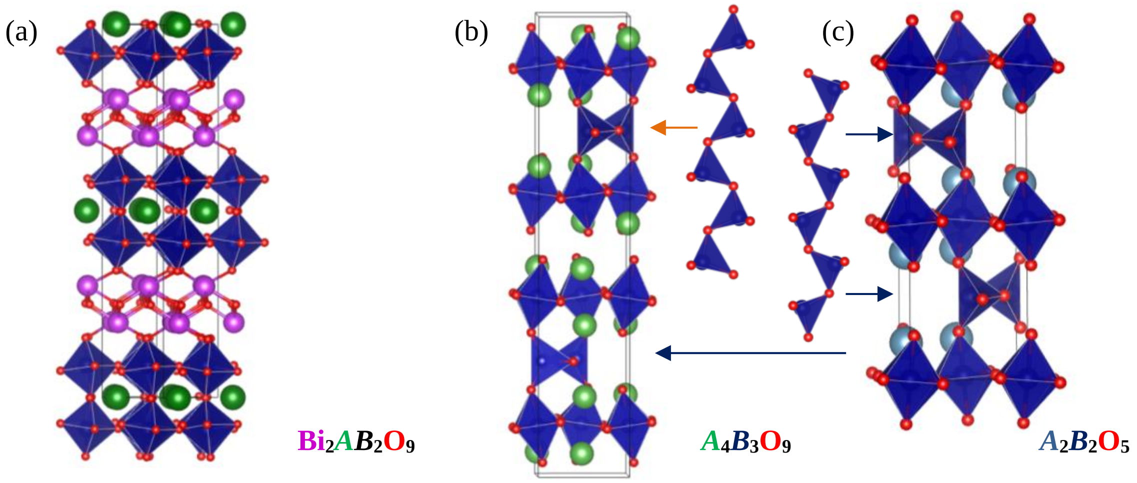

Figure 1 (a) polar structure of $n = 2$ Aurivillius phase $Bi_2AB_2O_9$; (b) shows the antipolar phase of an $A_4B_3O_9$ oxide such as $La_4Co_3O_9$,[4] and (c) shows the polar brownmillerite phase $A_2B_2O_5$ (e.g. $Ca_2Cr_2O_5$ [6]), with inset showing antipolar and polar rotations of tetrahedral associated with the $A_4B_3O_9$ and brownmillerite phases.

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