

## KN7 Structural Chemistry of Layered Hybrid Perovskites

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Lead halide perovskites (LHPs) have recently revolutionised the field of solar cells, in addition to showing novel and promising properties in several other areas, such as luminescence, ferroelectricity etc. The solid-state chemistry and crystallography of these materials is fascinating and complex, with a bewildering array of different compositions and structure types. Recently<sup>1</sup>, we have tried to systematise part of this complex structural diversity, by using an approach based on symmetry mode analysis to understand crystallographic relationships amongst layered phases of the type  $AA'PbX_4$  ( $X=Cl, Br, I$ ), which are based on (001)-oriented corner-sharing octahedral layers, related to perovskite. This talk will first discuss this classification, revealing some trends across structural behaviour versus chemical composition. We shall then discuss some examples of related structures from our own work; for example, the less common (110)-oriented layered lead halide perovskites<sup>2</sup>, and some novel structural behaviour and physical properties in halide hybrids based on tin<sup>3</sup> and copper<sup>4</sup>.

### References

1. J. A. McNulty and P. Lightfoot, *IUCrJ*, 8, 485-513 (2021).
2. Y.-Y. Guo et al., *Chem. Commun.*, 55, 9935-9938 (2019).
3. J. A. McNulty and P. Lightfoot, *Chem. Commun.*, 56, 4543-4546 (2020).
4. C. Han et al., *Inorg. Chem.*, 61, 3230-3239 (2022).