Algebraic analysis of topological domain-interface defects in crystals

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When crystals undergo phase transitions involving group-subgroup relationships, distinct regions of the low-symmetry child structure can possess distinct directions of the order parameter, which are related to one another via broken parent symmetries. The crystallographic community typically refer to these regions as *domains*. An interfacial boundary where two or more domains meet constitute a topological defect. Because such defects can either strategically or inadvertently influence material properties, it is important to understand what types of topological domain-interface defects (TBIDs) can arise in a given material. We will demonstrate that TBIDs can be algebraically characterized and classified using basic tools from group theory.

Keywords: domain-interface; topological defect; coset graph; group theory