Preface for Special Topic: Earth abundant materials in solar cells

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The development of new photovoltaic technologies has rapidly advanced in recent years. Solar cells based on lead halide perovskites have attracted significant attention due to their record light-to-electricity conversion efficiencies; however, they still face significant challenges for commercialization including chemical stability and toxicity. There is a large incentive to discover new classes of materials that can deliver similar performance to halide perovskites, while being formed of earth-abundant and non-toxic elements that can be processed sustainably over large areas.

This special issue provides a snapshot of current activity on the development of solar cell technologies outside of those already well developed industrially. There are reports on semiconducting halides and chalcogenides containing metals such as iron, bismuth, and antinomy. Each material faces a distinct set of challenges ranging from the need to avoid secondary phase formation, increase carrier lifetimes (decrease trap densities), to develop new electrical contact materials. Many of the papers contained in this issue showcase the power of combining experimental techniques for synthesis and characterisation with theory and simulation. We hope that they convey some of the excitement and significance of the field.

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