

MS17-2-1 Tuning electronic and phonon bands through disorder
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Abstract

Disorder in crystals is often far from random, and in some cases the local correlations of disorder can be tuned. The tuning of disorder allows a new handle to tune properties. By using simple models for electronic interactions and force constants, it is shown how crystals with identical average crystal structures, but different types of correlated disorder, can have different electronic and phonon band structures. It is further shown that by changing the type of disorder from random to correlated, it is possible to open band gaps, allowing for drastic changes to electronic properties. Single-crystal diffuse X-ray scattering is used as an effective way to distinguish between different types of local correlations, and the diffuse scattering is related to the changes to the band structures.

