



## Colloquium on Advanced Materials

# The nature of dynamic disorder in lead halide perovskite crystals

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Hybrid lead-halide perovskites have emerged as an excellent class of photovoltaic materials.

Dynamic disorder, induced by the polar methyl ammonium cation has been suggested as the root cause of the novel electronic properties observed near room temperature.

I will present a study where low-frequency Raman scattering is combined with first-principles molecular dynamics (MD) to elucidate the fundamental nature of this dynamic disorder.

By comparing the Raman scattering of hybrid and all-inorganic lead-halide perovskites, we find that dynamic disorder is intrinsic to the general lead-halide perovskite structure, and not unique to the dipolar organic cation. Using the Debye relaxation model, we find that the associated time scale of the disordered motion of both crystals in the cubic phase is a few hundred femtoseconds, comparable to the timescale associated with electron scattering.

Our findings suggest that a carrier moving through the crystal will experience a complex interplay with a dynamical and responsive potential.

Date:  
**27<sup>th</sup> of April 2017**

Time:  
**17:00 (s.t.)**

Place:  
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