Title:

A high spatial resolution measurement of trap states and charge motion in non-traditional semiconductors

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Abstract:

Novel photovoltaics utilize non-traditional semiconductors (SC), with low mobilities compared to traditional SCs. Their transport is limited by trap states -- localized states which remove charge carriers from desired device processes -- which can dominate transport and evolve during continual operation.

Conventional measurements average over entire devices, providing no information on spatial variation. Scanning probe techniques offer a unique opportunity for high spatial resolution investigations of traps. Here we present a time-resolved Kelvin Probe Force Microscopy technique that enables recording local carrier motion and the ability to distinguish between populating and depopulating the trap states by studying materials in realistic device geometries.