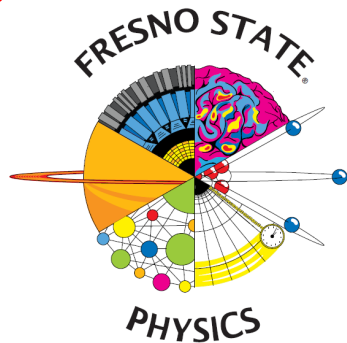




Physics Colloquium

Dr. Yize Li, California State University Bakersfield

Revealing Electronic Transport Properties and Defect Characteristics in One-Dimensional CsPbBr₃ Nanocrystals

ABSTRACT

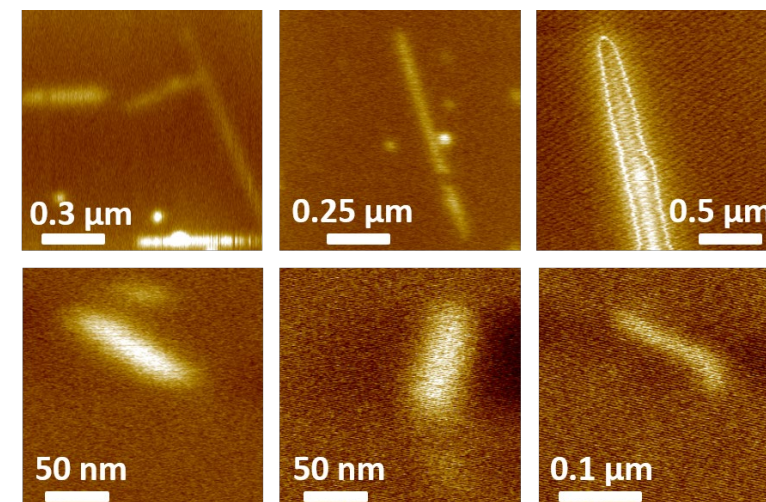
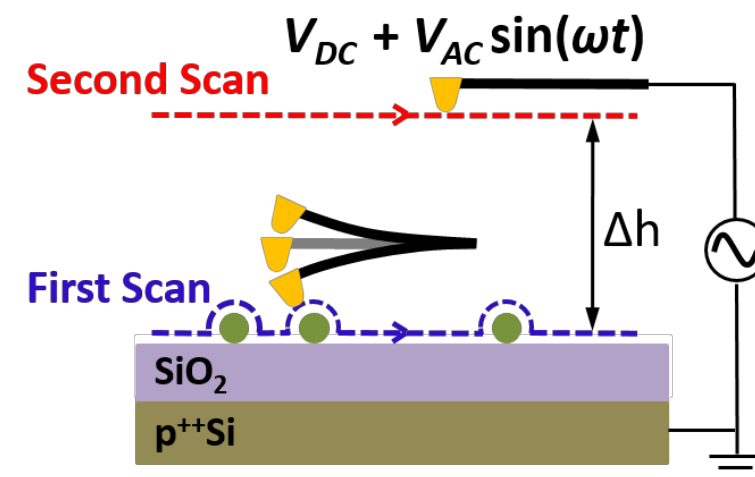
One-dimensional perovskite nanocrystals have attracted significant attention due to their promise in optoelectronic applications. All-inorganic CsPbBr₃ nanowires (NWs) and nanorods (NRs), owing to their unique optoelectronic properties, have garnered much interest. We studied the electronic transport properties in CsPbBr₃ NWs synthesized via a conventional hot-injection method and template-grown CsPbBr₃ NRs crafted using an amphiphilic bottlebrush-like block copolymer (BBCP) as nanoreactors [1], with a contactless, nondestructive imaging technique, dielectric force microscopy (DFM) [2, 3]. While ambipolar, p-type, and n-type responses were identified for different NWs in conventional samples, template-grown CsPbBr₃ NRs exhibited uniform ambipolar behaviors for up to two months before a transition to p-type behaviors occurred. Moreover, template-grown CsPbBr₃ NRs displayed improved nanoscale electronic homogeneity compared to their conventional counterparts. The remarkable improvement of the electronic uniformity and nanoscale homogeneity in template-grown CsPbBr₃ NRs, along with their enhanced stabilities, opens a new avenue of device applications utilizing one-dimensional perovskite nanocrystals with uniform electronic properties and minimum defects.

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[1] S. Liang, M. Zhang, S. He, M. Tian, W. Choi, T. Lian, and Z. Lin, *Nat. Synth.* **2**, 719-728 (2023).

[2] Y. S. Li, S. Liang, T. Trieu, R. R. Bautista, and Z. Lin, *ACS Appl. Energy Mater.* **5**, 4431-4438 (2022).

[3] E. Avila-Lopez, S. Liang, I. Elias, Z. Lin, and Y. S. Li, *Nanoscale* **16**, 9455-9461 (2024).



3:00-4:00 p.m., Friday, November 7th, 2025

In-person in McLane Hall 162