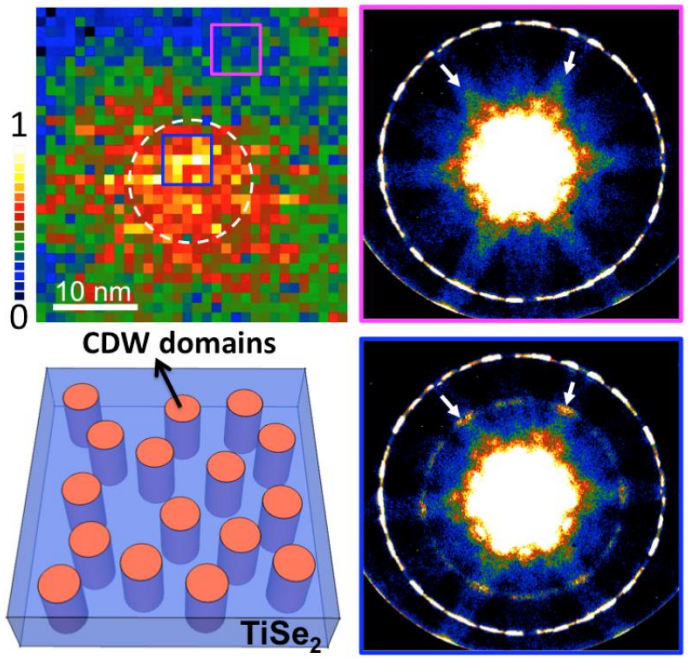
Anisotropic Charge Density Wave (CDW) in layered 1*T*-$TiSe_2$



Upper left: Real space mapping of the CDW line intensity showing a domain structure.
Upper and lower right: CBED patterns extracted from the pink and blue squares show 1x1x1 structure and 2x2x2 superlattice, respectively.
Lower left: Schematic showing cylindrically shaped CDW domains randomly distributed in the TiSe2 slab.

Scientific Achievement

Discovered cylindrically shaped anisotropic CDW domains with short-range in-plane coherence and long-range out-of-plane coherence

Significance and Impact

Reveals three-dimensional CDW domains at nanoscale, providing unique integrated approach to study the effect of reduced dimensionality in strongly correlated systems

Research Details

- Coherent nanoarea electron diffraction reveals the three-dimensional nature of CDW coherence, suggesting in-plane and out-of-plane anisotropy
- Position-averaged convergent beam electron diffraction reveals real space nanometer scale domain distribution with depth information
- Electron energy-loss spectroscopy and density functional theory calculations were combined to study the electron modulation

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