TOPICAL REVIEW

Spatial mapping of electronic states in κ-(BEDT-TTF)$_2$X using infrared reflectivity

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Abstract. We review our recent work on spatial inhomogeneity of the electronic states in the strongly correlated molecular conductors κ-(BEDT-TTF)$_2$X. Spatial mapping of infrared spectra (SMIS) is used for imaging the distribution of the local electronic states. In molecular materials, the infrared response of the specific molecular vibration mode with a strong electron–molecular vibration coupling can reflect the electronic states via the change in the vibration frequency. By spatially mapping the frequency shift of the molecular vibration mode, an electronic phase separation has been visualized near the first-order Mott transition in the bandwidth-controlled organic conductor κ-(BEDT-TTF)$_2$Cu[N(CN)$_2$]Br. In addition to reviewing SMIS of the phase separation, we briefly mention the electronic and optical properties of κ-(BEDT-TTF)$_2$X.

Keywords: organic conductor, Mott transition, phase separation, infrared spectroscopy, imaging

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