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Transmission Electron Microscopy as a tool for studies of carbon-based nanomaterials: tips and tricks to unveil the structure of carbon dots.

Date/Time: 15 January 2026, JST 10:00AM

Location: Kyoto Institute of Technology, Bldg.15, 2F, N205

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場 所: 京都工芸繊維大学 15号館 2F N205

ABSTRACT: Transmission Electron Microscopy (TEM) has become a cornerstone technique for probing carbon-based nanomaterials, offering direct access to size, morphology, crystallinity, defects, and interface structure at the nanometer–ångström scale. For carbon dots (CDs), however, extracting reliable structural information is uniquely challenging due to their low atomic number, beam sensitivity, frequent amorphous character, and the strong influence of surface ligands and residual organics. This seminar discusses the basic principles of TEM techniques and how to use them to probe the structure of CDs, distinguish true graphitic domains from imaging artifacts and contamination. Practical “tips and tricks” are highlighted, like dose-limited imaging and cryo/low-voltage strategies; conditions for contrast optimization; and validation workflows that combine lattice imaging with electron diffraction and XRD/Raman techniques. Emphasis is placed on common pitfalls and on best practices to confidently unveil the intrinsic structure–property relationships of CDs.