



**Monday, 21 November 2022**


Lecture Hall N24/H13, at 16:15

Coffee and cookies will be served in front of the lecture hall from 16:00

**Seeing into organic 2D materials – defects,  
dynamics, and resolution**

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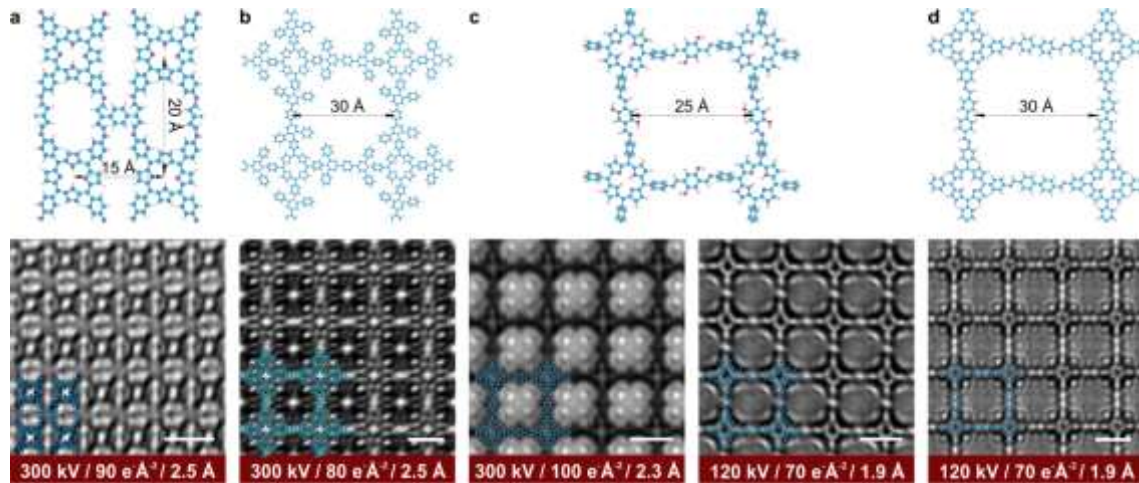
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Recent years have witnessed the rise of organic 2D materials (O2DMs), including 2D polymers (2DP), covalent organic frameworks (COF), and metal-organic frameworks (MOF)<sup>1</sup>. However, probing the structures of O2DMs via aberration-corrected high-resolution transmission electron microscopy (AC-HRTEM) remains a formidable task. Electron irradiation damage leads to the rapid disintegration of the molecular network during the imaging process, severely limiting achievable resolution regardless of TEMs' optical performance. In this talk, I will present various experimental efforts to extract high-resolution information from O2DMs, including low-dose approach<sup>2</sup>, optimization of electron dose efficiency<sup>3</sup>, and cryogenic conditions. The sub-2-Ångstrom resolution achieved on multiple 2D polymer systems offers insights into the crystal defects, i.e., grain boundaries, interstitials, and their formation mechanisms. The phase transition of a MOF upon different stimuli has been observed *in situ* down to the atomic scale.

1. *Nat. Chem.* **11**, 994–1000 (2019)
2. *Sci. Adv.* **6**, eabb5976 (2020).
3. *Nat. Commun.* **13**, 3948 (2022)

Pictures see next page



**Fig. 1. AC-HRTEM imaging of 2D polymers.**

Upper row: atomic models.

Lower row: AC-HRTEM images with the atomic models overlaid.

The acceleration voltage, electron dose and specimen resolution are specified. Scalebar: 2 nm.