In situ Transmission Electron Microscopy for Nanoscale Dynamics and Properties of 2D materials

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Abstract

With the development of transmission electron microscopy, many in situ experiments can now be carried out inside the transmission electron microscopes (TEM). We utilized low voltage aberration corrected TEMs for real-time observations of the dynamics in our two dimensional samples, up to the atomic scale.

The electron beam irradiation will be stressed. With proper selection of the samples and TEM conditions, the graphene edges, the hetero-structure between metallic atoms and graphene, or the novel 1D structures derived from 2D materials will be introduced in detail. High resolution observation is another critical point for our observations which can be directly related to state-of-art density functional theoretical calculations or even dynamical simulations.

The samples used in these studies covered many kinds of 2D materials, like graphene, carbon nanotubes, and transition metal dichalcogenide (MoS_2, WSe_2), etc.

This presentation will give an overview of the *in situ* TEM on 2D materials as well as insights into several topics related to new structure determination, anomalous diffusion, phase transition or mechanical analysis.

References

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[2] Zhao Jiong, Deng Qingming, Stanislav Avdoshenko, Jurgen Eckert, Mark Rummeli, "Direct Observation of catalytical processes and anomalous diffusion of single Fe atom on grapheme edges, (2014), *PNAS*, 111(2014)15641-15646.

Figures