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**High resolution electron microscopy and spectroscopy of ferritin in thin window liquid cells**[1] CANHUI WANG, QIAO QIAO, Univ of Illinois - Chicago, TOLOU SHOKUHFAR, Michigan Technological University, ROBERT KLIE, Univ of Illinois - Chicago — In-situ transmission electron microscopy (TEM) has seen a dramatic increase in interest in recent years with the commercial development of liquid and gas stages. High-resolution TEM characterization of samples in a liquid environment remains limited by radiation damage and loss of resolution due to the thick window-layers required by the in-situ stages. We introduce thin-window static-liquid cells that enable sample imaging with atomic resolution and electron energy-loss (EEL) spectroscopy with 1.3 nm resolution. Using this approach, atomic and electronic structures of biological samples such as ferritin is studied via in-situ transmission electron microscopy experiments. Ferritin in solution is encapsulated using the static liquid cells with reduced window thickness. The integrity of the thin window liquid cell is maintained by controlling the electron dose rate. Radiation damage of samples, such as liquid water and protein, is quantitatively studied to allow precision control of radiation damage level within the liquid cells. Biochemical reactions, such as valence change of the iron in a functioning ferritin, is observed and will be quantified. Relevant biochemical activity: the release and uptake of Fe atoms through the channels of ferritin protein shell is also imaged at atomic resolution.

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