A nanoview of battery operation
The redox-active materials in lithium-ion batteries have relatively poor electronic and ionic conduction and may experience stress from charge-discharge volume changes, so their formulation into structures with nanosized features is highly desirable. On page 566 of this issue, Lim et al. (1) characterize individual nanoparticles of the positive electrode material LiFePO$_4$ during charging and discharging. This "in operando" technique ensures that all particles experience the same voltage. The current and lithium concentration are then inferred for individual particles via the change in Fe oxidation state measured during the transformation from LiFePO$_4$ to FePO$_4$ and back.