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Chemical Shift Detection with Energy Dispersive Spectroscopy (EDS)[1] REBEKAH JIN, YARIN HEFFES, ALLEN WANG, Department of Physics and Astronomy, University of California, Los Angeles, JARED LODICO, B.C. REGAN, Department of Physics and Astronomy, University of California, Los Angeles; California NanoSystems Institute (CNSI), UCLA, MATTHEW MECKLENBURG, California NanoSystems Institute (CNSI), UCLA — Chemical bonds generally change the binding energies of an atom's core-state electrons in an effect called chemical shift. When aluminum is oxidized, its $L_{2,3}$ and K-edges shift up by 2-4 eV from the 73 eV characteristic of the pure metal. Here, we seek to develop a technique for measuring chemical shifts based on energy dispersive spectroscopy (EDS) instead of the commonly employed electron energy loss spectroscopy (EELS). When measured by the full width at half-maximum (FWHM) of x-ray peaks, EDS has an energy resolution of order 100 eV, but curve fitting can locate peaks to much better precision. We perform EDS mapping on a spectrum image sample of aluminum nanowire contacts with a partial aluminum oxide coating. For each EDS spectrum in the datacube, we fit the aluminum K-alpha peak with a Gaussian, locating the peak with a precision of 1 eV or better. We generate a map showing the x-ray energy at each real-space position, producing a line profile from a vertical (spatial) axis average which indicates an aluminum-aluminum oxide shift of around 10 eV, larger than the 2 eV expected based on EELS results from the literature. Though still ongoing, our work so far implies detectability; we are now continuing to investigate the source of the shift discrepancy.

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