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X-ray Structural Studies of Bi2Sr2CaCu2O8+δ Exfoliated Nanocrystals ANDREEA LUPASCU, Department of Physics, University of Toronto, RENFEI FENG, Canadian Light Source, LUKE J. SANDILANDS, ZIXIN NIE, VIKTORIYA BAYDINA, Department of Physics, University of Toronto, GENDA GU, Condensed Matter Physics & Materials Science Department, Brookhaven National Laboratory, SHIMPEI ONO, Central Research Institute of Electric Power Industry, YOICHI ANDO, Institute of Scientific and Industrial Research, Osaka University, KENNETH S. BURCH, YOUNG-JUNE KIM, Department of Physics, University of Toronto — Structural studies of nanocrystals produced via mechanical exfoliation are not only essential for examining structure quality or structural changes at reduced-dimensionality, but also for understanding the role of substrates in the exfoliation process. Highly focused, tunable synchrotron X-ray beams enable the use of non-destructive characterization tools to study exfoliated samples on a variety of substrates. We demonstrate that structural and spectroscopic information can be obtained on nanocrystals as thin as 6 nm, by using a combination of micro X-ray fluorescence (μ XRF), micro X-ray absorption near-edge spectroscopy (μ XANES), and X-ray microdiffraction (μ XRD) techniques. μ XRF is used to locate the sample of desired thickness; μ XANES and μ XRD are used to obtain electronic and structural information, respectively. We report a substantial substrate effect for Bi2Sr2CaCu2O8+δ nanocrystals exfoliated on Si/SiO2 and mica substrates. The "4.7 b" structural modulation, characteristic of bulk crystals, vanishes below a thickness of 60 nm on mica, and is drastically suppressed below 60 nm for the Si/SiO2 substrate.

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