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X-ray Characterization of Dye Adsorption in Coadsorbed Dye-Sensitized Solar Cells MITSUNORI HONDA[1], JAEA, MASATOSHI YANAGIDA[2], LIYUAN HAN[3], KENJIRO MIYANO[4], NIMS, JAEA TEAM, NIMS COLLABORATION — We performed X-ray measurements to elucidate the adsorption mode of N719 dye molecules on nanoporous TiO2 with and without coadsorption of D131 dye. Two techniques, X-ray photoelectron spectroscopy and near-edge X-ray absorption fine structure spectroscopy, were employed in order to obtain depth profile information about the substrate. In both cases, we found that the isothiocyanate groups of N719 strongly interact with TiO2 via S atoms when the dye is adsorbed from a single-component solution. In contrast, S-substrate interaction is strongly suppressed when D131 is coadsorbed with N719, indicating that the presence of D131 changes the adsorption mode of N719. Based on this finding, we designed a procedure to promote the preferential adsorption of D131, by which we successfully improved the short-circuit current and conversion efficiency.

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