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X-ray Reflectivity Study of Thermal Capillary Waves and the Interfacial Profiles of Water-Alcohol Mixtures YOONNAM JEON, JAEHO SUNG, DOSEOK KIM, Department of Physics and Program of Integrated Biotechnology, Sogang University, Seoul, Korea, WEI BU, DAVID VAKNIN, Ames laboratory and Department of Physics and Astronomy, Iowa State University, USA — The liquid/vapor interfaces of water-alcohol (methanol, ethanol, and propanol) mixtures were investigated by X-ray reflectivity. Analysis of X-ray reflectivity data shows that the interfacial widths (surface roughnesses) of all mixtures at a fixed temperature depend solely on the surface tension of the mixture, and the intrinsic surface roughness is on the order of inter-atomic distances, and within error, independent of solution constituents. The implications of our results in the regard to the origin of the intrinsic roughness and the capillary wave-vector cutoffs applicable to X-ray scattering will be discussed.

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