RUBBING INDUCED ANISOTROPY OF LONG ALKYL SIDE CHAINS AT POLYIMIDE SURFACES

HIMALI D JAYATHILAKE, ANDREY N BORDENYUK, CHAMPIKA WEERAMAN, and ALEXANDER V BENDERSKII, *Department of Chemistry, Wayne State University, Detroit, MI 48202*; MINHUA ZHU, CHARLES ROSENBLATT, *Department of Physics and Astronomy, Case Western Reserve University, Cleveland, Ohio 44106-7079*.

Polymer surfaces used as alignment layers in liquid crystal displays were investigated using vibrational Sum Frequency Generation (SFG) Spectroscopy[a]. Molecular orientation of CH_3 and CH_2 stretch modes of the long side alkyl chains in the polymer surface was determined by measuring the polarization-selected SFG spectra. We found that the mechanical rubbing and baking, an accepted industrial procedure used to produce pretilt of the liquid crystal, induce pronounced azimuthal anisotropy in the orientational distribution of the side alkyl chains. Previously, only backbone anisotropy has been observed for rubbed polymer [b]. Further analysis of the SFG spectra in terms of the azimuthal and tilt angles (in- and out-of-plane, respectively) of the alkyl side chains shows their preferential tilt along the rubbing direction, with the azimuthal distribution narrower for stronger rubbed polymer samples and broader for weakly rubbed polymer samples.

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[a] H. D. Jayathilake, M. H. Zhu, C. Rosenblatt, A. N. Bordenyuk, C. Weeraman, and A. V. Benderskii *Journal of Chemical Physics* **125**(6), 064706, 2006.

[b] M. Oh-e, A. I. Lvovsky, X. Wei, and Y. R. Shen *Journal of Chemical Physics* **113**(19), 8827, 2000.