NEW MODEL SURFACES FOR MINERAL AEROSOLS: ANILINE-LINKED OLEFINS ON SILICA STUDIED WITH BROADBAND VIBRATIONAL SUM-FREQUENCY GENERATION

AVRAM M. BUCHBINDER, GRACE Y. STOKES, JULIANNE M. GIBBS-DAVIS, KARL A. SCHEIDT, FRANZ M. GEIGER, *Department of Chemistry, Northwestern University, 2145 Sheridan Road, Evanston, IL 60208*.

Olefin-functionalized silica surfaces and their reactions apply to catalysis, materials science and atmospheric chemistry, however, their high vapor pressures make it difficult to study their heterogeneous reactions at room temperature. We use vibrational broadband sum frequency generation (SFG) to characterize glass surfaces functionalized with olefins, circumventing issues associated with the high vapor pressures of many olefins. Using various ester-, amide- and aniline-based linkers, a number of cyclic and acyclic olefins are chemically bound to borosilicate glass surfaces via siloxanes. These systems model the surfaces of atmospheric mineral-dust aerosols coated with biogenic unsaturated organic molecules that are often oxidized by tropospheric ozone. While aliphatic linkers contribute spectral peaks that overlap with the region of interest for studying olefin chemistry, spectra of aniline-based linkers show that their use minimizes linker-attributed spectral congestion in the aliphatic C-H spectral region. Studies of various aniline-linked olefins also elucidate the spectral features of cyclic olefins as compared to acyclic counterparts. These results demonstrate the effectiveness of using phenyl-linked olefins on silica for SFG studies of tailor-made organic surfaces designed to address complexity issues in catalysis, materials science and atmospheric chemistry.