The molecules of life are chiral, and chiral synthesis is an important route to biologically useful chemicals. Biological amino acids are levorotatory, but circular dichroism cannot detect chirality in monolayers of these small molecules at surfaces during heterogeneous chiral synthesis, as the response is very weak. Chiral second-harmonic generation (SHG) from ultra-thin layers of larger, more polarizable organic molecules has been detected at silica surfaces, where the presence of electronic resonances enhances the signal [1, 2]. Non-resonant chiral SHG has also been reported from multilayers of cysteine adsorbed on silica and silicon surfaces, where the strength of the response indicated probable monolayer sensitivity [3].

Here the chiral response of cysteine monolayers adsorbed on atomically clean, well-ordered Au(110) under ultra-high vacuum conditions is explored. Using unamplified femtosecond excitation, reproducible differences in the SH response from the R- and S-monolayers are observed when rotating a quarter-wave plate polarizer and detecting the s-polarized SH output at 400 nm. Possible origins of the differences are discussed.

Keywords: Chiral, SHG, Monolayer

References