

Title: Effects of Hydrogen Bonding in Modified Nylon Polyamides

Abstract: N-alkoxyalkyl polyamides were originally synthesized by Theodore Cairns in the late 1940s.¹ These polymers, specifically N-methoxymethyl polyamide 6,6 (Nylon 6,6), were easily dissolved in aliphatic alcohols like methanol, and a clear, matte finished, cast film could easily be formed. This polymer was of use in the art conservation field where it was used as a coating for art ranging from paintings to cedar wood doors. Unfortunately, N-methoxymethyl Nylon 6,6 (soluble Nylon) is no longer used in art conservation due to the accumulation of dust and dirt, yellowing of the film, peeling, and extreme difficulty of removal. This project aims to observe the changes in hydrogen bonds present in Nylon 6,6 and its soluble Nylon derivatives using temperature dependent Raman spectroscopy. Raman active peaks were first computed using GaussianTM 16². Raman spectra were collected from 1800 cm⁻¹ to 1000 cm⁻¹ in 10°C increments from room temperature to 220°C in Nylon 6,6 and 160°C in N-methoxymethyl Nylon 6,6. The resulting spectra shows a trend of decreased Raman intensity as temperature increased towards the melting point of each polymer. This infers that there is less intermolecular hydrogen bonding interactions as temperature increases. By comparing both the spectral differences and the computed vibrational modes between Nylon 6,6 and soluble Nylon, relative trends in hydrogen bonding between the materials will be explored.

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