

INTERFACIAL INSIGHTS: PROBING POLYMER CONFORMATIONS WITH SFG SPECTROSCOPY. **Bianca Martins de Lima**<sup>1</sup>, Paula Wood-Adams<sup>2</sup>, Patrick Hayes<sup>3</sup>, <sup>1</sup>Concordia University, Department of Chemical and Materials Engineering, 1515 Ste, Montreal, QC H3H 2L5, Canada. <sup>2</sup>University of Northern British Columbia, 3333 University Way, Prince George, BC V2N 4Z9, Canada; <sup>3</sup>Université de Montréal, Department of Chemistry, 1375 Avenue Thérèse-Lavoie-Roux, Montreal, QC H2V 0B3, Canada. (bianca.martinsdelima@concordia.ca)

Polymer thin films are widely used in biomedical applications, microelectronics, specialized coatings, and membranes. The interfacial region between the film and its surroundings significantly impacts macroscopic properties, including crystallization, adhesion and wettability. The ability to probe, control and tailor the conformation of these interfacial chains becomes crucial for ensuring the applicability and stability of thin films across various applications. Through innovative applications of SFG spectroscopy, our research established correlations between chain molecular weight, thermal and mechanical sample history, interfacial chain conformation, and macroscopic polymer properties. Our three key research avenues are: 1. Investigating the influence of polymer molecular weight (Mw) on molecular conformation near highly interactive substrates [1]; 2. Analyzing the differences in polymer conformations across various interfaces (e.g. polymer/air and polymer/substrate) and their influence on the polymer dewetting behavior [2]; and 3. Broadening the scope of SFG spectroscopy applications to address new analytical challenges, such as determining the surface lamellar orientation of semi-crystalline polymers [3]. These insights offer a foundation for future studies in polymer science and materials engineering, driving advancements in thin film technology and applications.

[1] de Lima, B.M.; Hayes, P.L.; Wood-Adams, P.M., *Langmuir* 37 (2021), 10036.

[2] de Lima, B.M.; Hayes, P.L.; Wood-Adams, (2024) in preparation.

[3] de Lima, B. M.; Hayes, P. L.; Wood-Adams P. M., *Anal. Chim. Acta* 1248 (2023), 340904.