

## MRI Undergraduate Fellowship – Surface Chemistry Analysis of Irradiated Silk Fibroin

The MRI undergraduate fellowship is a 1-yr long paid research experience for undergraduates mentored by senior staff scientists within the user facilities of MRI. Students obtain extensive training and operation experience on a particular tool, gaining in-depth knowledge about the applications, limitations, and functions of the tool.

The MRI undergraduate fellow project highlighted in this poster is an exploration of the changes in surface chemistry of silk fibroin as a function of low-energy Ar irradiation in a vacuum environment, which has shown to demonstrate anti-microbial properties. The surface chemistry of the silk fibroin is explored through both polarized FTIR and AFM-IR, the latter being a recently developed IR spectroscopy characterization technique providing nanometer lateral and spatial resolution. A design of experiments for the AFM-IR measurements was developed to optimize the signal-to-noise ratio, reproducibility, and verification of the IR signal depth as a function of the pulse frequency of the AFM-IR laser. The work here demonstrates that AFM-IR is uniquely able to probe the surface chemistry of textured surfaces, while also providing topographic and mechanical information.