Abstract Submitted
for the MAS20 Meeting of
The American Physical Society

Characterization of Silk/Cellulose Biocomposites Infused with rGO ABNERIS MORALES, Self, BAILEY BLESSING, KARLEENA RYBACKI, STACY LOVE, SEAN O'MALLEY, co-author, XIAO HU, Collaborator, DAVID SALAS-DE LA CRUZ, PI, ROWAN UNIVERSITY COLLABORATION — In the recent years, biomaterials from renewable sources have shown potential in medicine and materials science alike. Biomaterials are a class of materials and have been of interest in the recent decades due to their abundance, low cost, biocompatibility, and tunable morphological and physicochemical properties. Cellulose is appealing to the industry due to its crystalline and amorphous regions; while silk is made up of flexible protein fibers, is attractive due to its tunable biodegradation and biocompatibility. When the two natural polymers are mixed together, their properties can be tuned by changing material composition and fabrication method. Reduced graphene oxide (rGO) is ideal to increase molecular interactions and stabilization of these two components due to its strong oxidizing properties. We explore how rGO affects the carbohydrate crystallinity and protein secondary structure formation as well as their physicochemical properties including ionic conductivity. The biocomposites with rGO were investigated using FTIR, SEM, X-Ray Scattering, DSC, TGA, and DRS. The results showed that rGO stabilizes the morphology and thermal properties of the biocomposites. Additionally, they demonstrate that the cellulose crystallinity and the silk beta sheet content influence the ionic conductivity of the materials. With the DRS data collected as well as the Fulcher VFT Model and Arrhenius expression, the activation energy of the biocomposites were calculated.

Abneris Morales
Self

Date submitted: 17 Nov 2020 Electronic form version 1.4