Abstract Submitted
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Physical Characterization of Functionalized Silk Material for Electronic Application and Devices[1] EDEN STEVEN, National High Magnetic Field Laboratory, USA, ERIC JOBILIONG, University of Pelita Harapan, Indonesia, JIN GYU PARK, ANANT PARAVASTU, MICHAEL DAVIDSON, MICHELLE BAIRD, RUFINA ALAMO, PAPATYA KANER, JAMES BROOKS, THEO SIEGRIST, National High Magnetic Field Laboratory, USA — Naturally harvested spider silk fibers are investigated for their physical properties under ambient, humidified, iodine-doped, pyrolized, sputtered gold and carbon nanotube coated conditions. The functional properties include: humidity activated conductivity; enhanced flexibility and carbon yield of pyrolized iodized silk fibers; full metallic conductivity and flexibility of micron-sized gold-sputtered silk fibers; and high strain sensitivity of carbon nanotube coated silk fibers. Magic angle spinning nuclear magnetic resonance (MAS-NMR) and Fourier transform infrared spectroscopy (FTIR) are used to explore the nature of ambient and functionalized spider silk fiber, and significant changes in amino acid-protein backbone signature are correlated with gold sputtering, and iodine-doped conditions. The application of gold-sputtered neat spider silk fibers for making four terminal flexible, clean, ohmic contacts to organic superconductor samples and carbon nanotube coated silk fibers for heart pulse monitoring sensor are demonstrated. The role of silk thin film in organic thin film transistor will be briefly discussed.

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