Theanne Schiros, PhD

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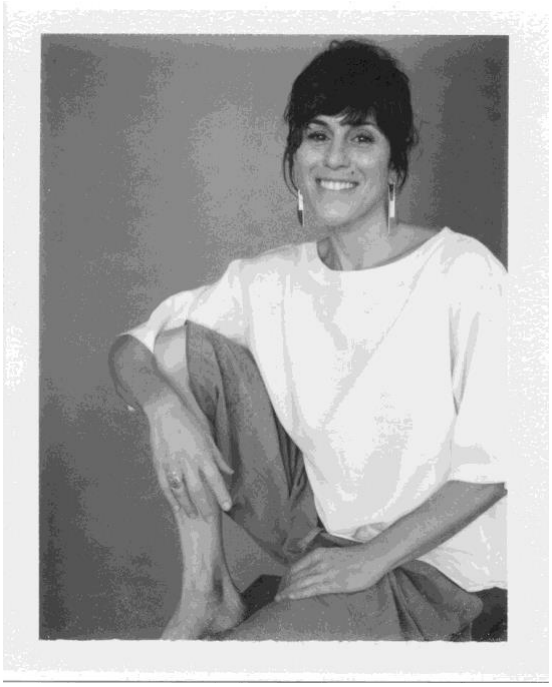

Session: Sustainable and Smart Fashion

Title of Talk: Biofabrication of Textiles for a Circular Material Economy

Bio: Theanne Schiros, PhD, is an Associate Professor of Materials Science at FIT, where she guides students to rethink materials in collaboration with nature, using the tools of biotechnology, zero-waste design and life cycle impact assessment. She is also a Research Scientist at Columbia University in the Materials Research Science and Engineering Center, a co-founder and the CSO of Werewool, developing biodegradable textile fibers with biomimetic, DNA-programmed color and performance, and the former co-founding Scientific Advisor for Algiknit (now Keel Labs). Her research focuses on development and characterization of advanced materials for climate action, including clean energy technology and regenerative, high performance biotextiles for a circular economy. Her research has received international recognition, including the Microfiber Innovation Challenge (2022) and the 2020 H&M Foundation Global Change Award (Werewool), and the 2017 National Geographic Chasing Genius Award (Sustainable Planet-Algiknit), with exhibitions of microbial bioleather prototypes at the Wyss Academy for Nature in Bern, Switzerland (2022) and the Montreal Museum of Fine Arts (2023). Theanne has served as a United Nations ECOWAS Centre for Renewable Energy and Energy Efficiency Fellow for Sustainable Energy Engineering, a New York State Energy Research and Development Authority Fellow, and an Energy Frontier Research Center Fellow, developing sustainable energy systems, photocatalysts and photovoltaics. Theanne has been engaged in international sustainable development and education since 2005, including off-grid solar photovoltaics with Engineers without Borders (Haiti), design of zero waste communities at

Finca Morpho Permaculture (Costa Rica), and women empowerment with There is No Limit Foundation (West Africa).

Abstract: The current linear, cradle-to-grave model of the textile industry makes it a leading source of global carbon emissions, waste and pollution. Bioinspired and bioengineered textiles have tremendous potential to support a sustainable fashion industry and drive a circular economy. The bottom-up assembly of polymers from living cells offers unique advantages to tune and meet key design criteria for multi-functional, circular economy textiles, contingent upon development of innovative green processing methods. For example, harnessing microbial biosynthesis of nanocellulose and inspired by ancient textile practices, we engineer a high-performance bioleather with a sustainable circular life cycle. A lecithin-tanned bioleather is demonstrated with improved mechanical and superior flame-retardant properties, low environmental impact, and natural soil degradability. Beyond nanocellulose, gene editing of microbes enables biofabrication of a wide range of degradable polymers with targeted properties. For instance, Werewool is an early stage startup that uses microbes to produce designer proteins that map nature's blueprints for function into regenerative performance protein fibers. Werewool is developing a new class of textile fibers that plug and play in today's fashion industry, with inherent color and performance properties-like stretch- without dyes, plastics and water pollution, Beyond textiles, these innovations demonstrate the potential of combining biofabrication with green bioprocessing and waste-to-resource strategies for a circular economy.