

MATERIALS AND BIOMATERIALS SCIENCE AND ENGINEERING

Creating Bioinspired Ceramics from Fungi

ABSTRACT

Fungi is an incredibly diverse biological kingdom with many diverse organisms (including molds, rusts, lichens, mushrooms, among others) with a wide variety of mechanical and material properties. Basidiomycota, a division of this biological kingdom, are filamentous fungi, that form a wide variety of structures using hyphal filaments, sometimes called mycelia. These filaments, or hyphae, can change their structure and combine with other filaments to make a wide variety of structures with properties that range from tough and woody to soft and squishy. Analysis of some of these structures, such as the mushrooms of a variety of species, has shown that on a microscale the hyphal filaments form a networking structure that, for some species, provides improved directional mechanical resistance. These porous materials may offer a template for porous materials that maintain desirable specific properties (e.g., specific strength). Mushrooms are being explored as a means of creating advanced porous materials using biotemplating, where a natural material acts as a pattern to create an inorganic replica of the natural structure down to the microscale and beyond. These biotemplated mushrooms maintain a porous structure, maintain some functional properties of the mushrooms, but have increased mechanical properties.

BIOGRAPHY

Dr. Debora Lyn Porter is an assistant professor in Mechanical Engineering at UC Merced. She joined UC Merced in July 2023 following the completion of her Ph.D. at the University of Utah (also in Mechanical Engineering). Her research focuses on the nexus of biology and advanced materials, largely focusing on the diverse structures made by fungi and creating bioinspired porous materials. In September of 2024 she received an Early Career Award through the MSI/HBCU program at the Army Research Lab to research the mechanisms of damage and failure in mushroom-derived silica structures.



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Refreshments: 1:45pm, Seminar: 2-3pm