

The Living Factory

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An exploration of a nacre inspired bacterial composite for use in the sportswear industry.

High performance composite materials combine two or more materials in a way that allows them to retain their original properties while constructing a material superior to either constituent on its own. They are widely used across many industries, including sportswear. Their applications demand a lightweight, resilient material that is currently achieved by using highly toxic and difficult to break down materials such as epoxy resins and thermoplastics.

How can we create innovative composite materials possessing comparable properties to synthetics through low energy processing with the use of non-petroleum and more natural based components?

This project explores a mother of pearl, or nacre, inspired bacterial composite for use in the sportswear industry. Employing additive microbial manufacturing, I have combined the metabolic processes of two bacteria: *S. Pasteruii* - a calcite precipitating bacteria and *B. licheniformis* - a bacteria that excretes a biopolymer into one structurally advanced material. Building on the research led by Dr Anne Meyer at the University of Rochester in New York, the inorganic mineral and biopolymer grow in alternating layers to build a 'brick and mortar' nanostructure that mimics natural nacre. This tessellated structure gives the material a high resilience to fracture and increases its toughness by three thousand to that of just the mineral alone.

Working from the confinement of my London flat during Covid-19 lockdown, I have looked at what it means to design with life systems in an environment not meant for it and how bio-designers can be more resourceful. I have had to break away from the intimidating science rigour of academic institutions and take inspiration from the DIY-bio community.

