

Ceramic skins insulate and protect city buildings and inhabitants

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Illustration by Latifi showing her ceramic skin system on a building surface.
Credit: Dr. Mehrnoush Latifi Khorasgani

Dr. Mehrnoush Latifi Khorasgani is a lecturer in architecture at the Swinburne School of Design, and Theme Leader of the Smart Skins Smart(er) Cities research stream for Future Urban Infrastructure at the

Swinburne Smart Cities Research Institute. She exhibited her Fireless Skin, a non-flammable skin for buildings, in a group exhibition with fellow designers and academics during Melbourne Design Week.

Latifi is a practising architect who bridges science and art in her creative practice. She investigates and develops ceramic skin systems that function as insulative and thermodynamic shells for buildings and structures. Her creative practice, research and teaching spans the fields of architecture, virtual and augmented reality, thermal comfort, microclimate design, and digital fabrication.

When applied to the surfaces of buildings, her interlocking hollow ceramic tile systems provide protection from cold, heat and noise. Her Fireless Skin design is a system of hollow ceramic building tiles that are filled with mycelium to improve the thermal and acoustic properties of walls and structural surfaces. The tiles feature customisable decorative surfacing and glazing options created using digital and traditional production technologies.

Latifi is currently analysing the thermal performance of the ceramic-mycelium material at Swinburne. The Fireless Skin project has multiple collaborators researching ceramic, mycelium and the use of additives such as glass fines.



Stacked ceramic tiles at the Fireless Skin exhibition. Credit: Dr. Mehrnoush Latifi Khorasgani

"The idea of looking at ceramic components as an active skin for buildings, to collect energy through a façade, or to use a biomaterial inside as an insulation layer is the main focus of my research at Swinburne," Latifi explains.

"My research for Smart Skin Smarter Cities at the Swinburne Smart Cities Institute focuses on the design of 'active skins' for buildings. This is about using the [skin](#) of buildings as an opportunity to generate energy and to create pleasant microclimates for cities and inhabitants," she says.



Assembled ceramic tiles with mycelium fill, at Fireless Skin exhibition. Credit: Mehrnoush Latifi

With recent catastrophic failures of flammable cladding systems in Australia and overseas, Latifi says installing ceramic tile components filled with air or biomaterials such as mycelium (also making the components lighter), could be a viable alternative.

"Fully glazed facades are also problematic. They are turning our cities into jungles of iron and glass that can burn surrounding environments on hot days. Facade layering is an opportunity to not only protect people who are living and working inside a [building](#) but to also create pleasant microclimates in our cities," says Latifi.

Provided by Swinburne University of Technology

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