

Crystallisation research mimics nature

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(PhysOrg.com) -- Research by Victoria University PhD graduate Dr Conrad Lendrum into the crystallisation of calcium carbonate could have far-reaching implications for everything from materials processing to the manufacture of food.

"Nature is able to produce complex hierarchical structures from simple [inorganic materials](#) that are highly functional, whereas when we try and replicate those ceramic shapes, we end up with flaws and a limited functionality," says Dr Lendrum.

His research focused on understanding how nature uses a soft scaffold or template to control the size, shape and orientation of calcium carbonate (chalk or limestone) crystals.

"Using a simplified model system, my research showed that [calcium carbonate](#) growth, when influenced by a soft responsive scaffold, involved the generation of a three-dimensional network that forms prior to crystallisation, and the rearrangement of the scaffold."

Dr Lendrum, who has been employed as a research scientist by Industrial Research Limited (IRL) since 2001, says his research also highlighted the necessity of a degree of randomness in the scaffold.

"The scaffold is not a rigid template as is typical in materials fabrication. Rather, limited disorder provides the necessary freedom for the scaffold and the forming crystal to find a structural and chemical match. Anecdotally, the scaffold subtly manipulates the crystallisation rather

than providing a rigid/directed template."

As part of his PhD study, he travelled to Chicago three times to use [cutting edge technology](#) that enabled him to observe the real-time rearrangement of the soft scaffold in response to crystallisation.

Dr Lendrum says his findings could affect the control of crystallisation in sectors as diverse as tissue engineering and ice cream manufacture.

"We still have some way to go but in understanding how a soft scaffold manipulates crystal formation, but such control could produce ice-free ice cream and the fabrication of improved bone implants."

Dr Lendrum graduated with a PhD in Chemistry in December 2009 and was supported by funding from IRL, Victoria University and the MacDiarmid Institute. His supervisor was Associate Professor Kathryn McGrath.

Provided by Victoria University

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