FP6 News

Cheaper plaster on the cards

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Researchers in Spain and the United Kingdom have identified the stages of gypsum crystals formation - a mystery that boggled the minds of many over the years. A mineral that occurs naturally, gypsum is usually used in industrial processes. If left untouched for thousands of years, gypsum can develop into large, over 10-metre tall and translucent crystals. The study was funded in part by the MIN-GRO ('Mineral nucleation and growth kinetics: generating a general, fundamental model by integrating atomic, macro- and field-scale investigations') project, which received a Marie Curie Research Training Networks grant worth EUR 3 million under the EU's Sixth Framework Programme (FP6). The results were published in the journal Science.

In their study, researchers from the School of Earth and Environment at the University of Leeds in the United Kingdom and from the Laboratorio de Estudios Cristalográficos CSIC-University of Granada in Spain discovered that gypsum, which is also referred to as Plaster of Paris, begins as small crystals of the bassanite mineral. Gypsum is used in construction, casts, fireproofing and even artwork.

Bassanite plaster is currently produced at an annual rate of 100 million tonnes. Quarried gypsum is dehydrated at 150 degrees Celsius. Bassanite powder is purchased by builders, medical specialists and artists who add water to make a malleable material that becomes hard after it becomes dry. The team generated bassanite at room temperature, and this in turn converted into gypsum.

'This process has never been documented before,' said Professor Liane G. Benning from the University of Leeds. 'In nature, gypsum grows as these fantastic large crystals, yet we show that in the lab gypsum actually grows through the assembly of many, tiny bassanite crystals. These link together like a string of pearls before they crystallise to gypsum. We studied hundreds of high-resolution images and caught the tiny bassanite crystals in the act of assembling into gypsum.'

Commenting on the findings, lead author Alexander van Driessche from the Laboratorio de Estudios Cristalográficos in Grenada said: 'Our study shows a new, low-cost and low-temperature way of making bassanite, although so far we have only managed to keep it stable for up to one hour.'

The researchers say the results could be used to help reduce the clogging of pipes and filters through the precipitation of gypsum during water desalination or oil production. This would result in huge savings when removing gypsum from a pipe. Countries with problems in securing potable water would benefit specially from this development because the cost of removing gypsum from a pipe can be very high.

'The study reveals how a natural mineral forming process can have important economic consequences for our daily lives,' explained Professor Juan Manuel Garcia Ruiz of the Laboratorio de Estudios Cristalográficos. 'It also tells us how nature can make such beautiful and enormous crystals as seen in the caves at Naica or even the gypsum and bassanite, recently documented on Mars.'

In conclusion, Professor Benning said: 'If we manage to produce and stabilize bassanite crystals at room temperature through a clean, green method for long periods, we don't just learn

something about a natural process but, compared to what is industry standard currently, our research could also lead to a massive cost and energy saving for the production of plaster.'

For more information, please visit:

University of Leeds:
http://www.leeds.ac.uk/

Laboratorio de Estudios Cristalográficos:
http://www.lec.csic.es/

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