NATURAL ENVIRONMENT RESEARCH COUNCIL

NEWS FROM THE NATURAL WORLD
Planet Earth Online

NEWS

Plaster grown in the lab

10 April 2012, by Adele Rackley

New research could be the first step towards a much cheaper and more efficient way to make plaster.

Scientists have reproduced the early stages of gypsum crystals in their laboratory, a process which could lead to a cheap way to manufacture the plaster of Paris that's used by builders, artists and medical practitioners.

Giant gypsum crystals up to 11 metres long in the Cave of Crystals, Naica, Chihuahua, Mexico.

Chances are it's on the walls and ceiling of the room you're in now – 100 million tons of plaster of Paris, are manufactured every year from the naturally occurring mineral gypsum. As well as in the building industry, it's widely used by artists and in medicine.

Plaster is made by first quarrying the gypsum, then driving out its water content to leave a powder made up of mineral called bassanite. It's an energy-hungry process with a large carbon footprint.

But now researchers have documented the first steps that could lead to turning this process around.

Scientists from the University of Leeds and the CSIC-University of Granada in Spain, experimented with supersaturated gypsum solutions to try to figure out how gypsum crystals form – something that is not well understood. To their surprise they found that the first phase to form in the solution were bassanite nanoparticles – but under thsoe chemical conditions bassanite should not have formed at all.

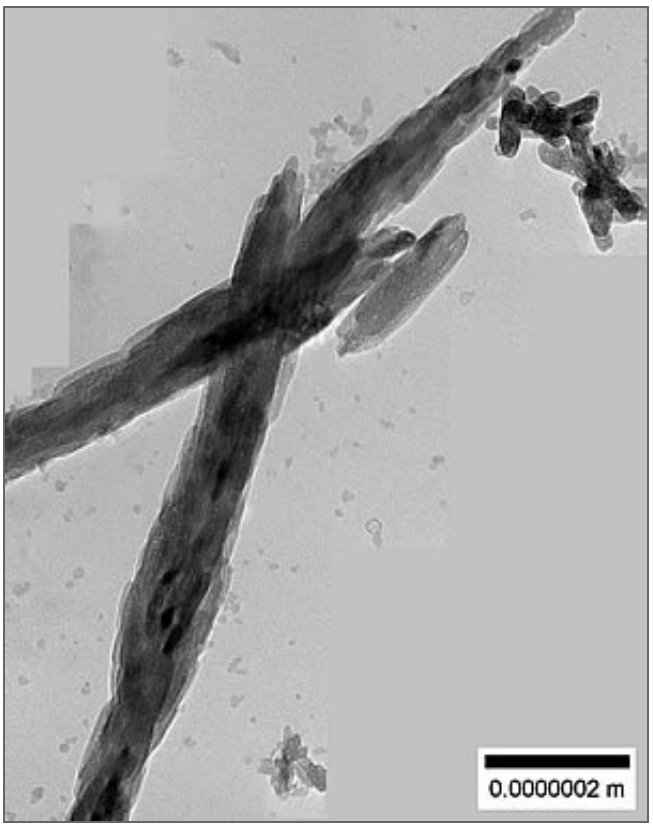
By taking a series of high resolution images they watched these tiny particles growing into rods and joining up into strings that eventually transform into gypsum crystals.

And this all happened at room temperature, so in principle this could become a low-energy way of producing the raw material for plaster of Paris.

'We were really surprised to discover these nanoparticles – they're just not supposed to be there,' explains 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 crystallize to gypsum.'

'Our study shows a potentially 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,' explains Alexander van Driessche the lead author of the study, which is published in *Science*.



Tiny assembled bassanite nanoscrystals in the lab, just before they transform to gypsum.

The work could also prove useful for reducing pipes and filters clogging when gypsum forms during water desalination or oil production. It can cost millions of pounds to remove gypsum from a pipe – a significant cost, especially to countries that already find it challenging to supply clean drinking water.

'If we manage to produce and stabilise 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,' says Benning.

Left alone in its natural state, gypsum can grow into towering, translucent crystals like those in Mexico's famous Cave of Crystals, pictured above. But until now still little has been known about how they actually formed.

AES Van Driessche, LG Benning, JD Rodriguez-Blanco, M Ossorio, P Bots and JM Garcia-Ruiz. The role and implications of bassanite as a stable precursor phase to gypsum precipitation, 2012 *Science*

Keywords: Geology,

Interesting? Spread the word using the 'share' menu on the top right.

Your comments

Post a comment

There are no comments at this time. Be the first to comment on this news story.
