

NOVEL SELECTIVE METHOD FOR THE PRODUCTION OF BASSANITE NANOPARTICLES

Technology for Licensing

Keywords:

Calcium sulfate, nanobassanite, hemihydrate, alkoxide, production, nanoparticles, nanogypsum

Description:

Bassanite ($\text{CaSO}_4 \cdot 0.5\text{H}_2\text{O}$) is a calcium sulphate phase, important due to its applications in bone regeneration processes, targeted drug delivery, or as strengthening material of architectonic and/or archaeological works made from gypsum. Nevertheless, its selective production is still a challenge: it is hard and laborious to obtain pure phases, to control calcium sulphate polymorphism, and the particles size and surface area.

In this sense, it becomes of special interest the synthesis of bassanite nanoparticles with a high reactivity along with excellent features for multiple applications. However, due to the problems abovementioned, current methods are too complex, inefficient, or do not get the desired component with the desired properties.

To come to a solution, a novel methodology has been developed. In only three steps, it produces small sized bassanite nanoparticles with a large surface area and high reactivity. The main advantage is the selective production of the desired compound, with no by-products.

The method consists of a solvothermal synthesis that starts with a redox reaction between calcium metal and an aliphatic alcohol to produce calcium alkoxides. These will later react with sulfuric acid in the presence of toluene, resulting in an alcoholic suspension of bassanite nanoparticles. Finally, this solvent mixture evaporates to generate nanoparticles in powder form.

By using this method, it will become possible to meet current needs in the fields of heritage restoration, construction, and biomedicine.

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A new efficient, simple, selective and no-byproducts method for the synthesis of bassanite nanoparticles has been developed. Its application will meet current needs associated to the production of these nanoparticles, which can be used in different sectors such as heritage restoration, construction or biomedicine.

Advantages and Benefits

» Simple method

It consists of only three steps that take place in accessible conditions.

» Selective production

The only calcium sulphate phase obtained is bassanite.

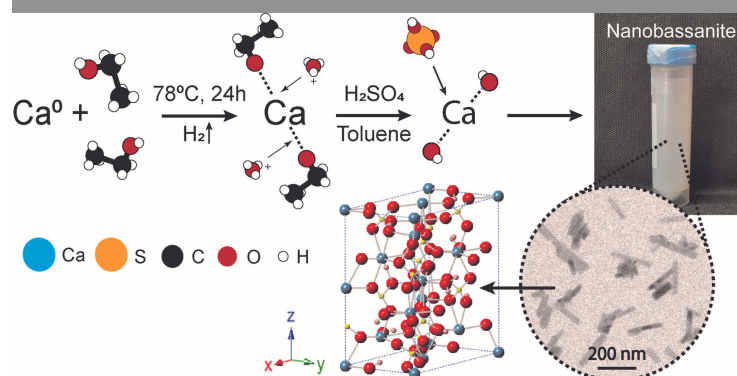
» No by-products

With this method, no compounds other than calcium sulphate are produced.

» Resulting nanoparticles are small-sized, with a high surface area and reactivity

» High global yield

The general reaction, calculated over the mass of the produced bassanite related to the theoretical mass, is equal or greater than 95%.



Schematic representation for the proposed synthesis of nano-bassanite particles

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