Greener production process of key component in biomedicines developed

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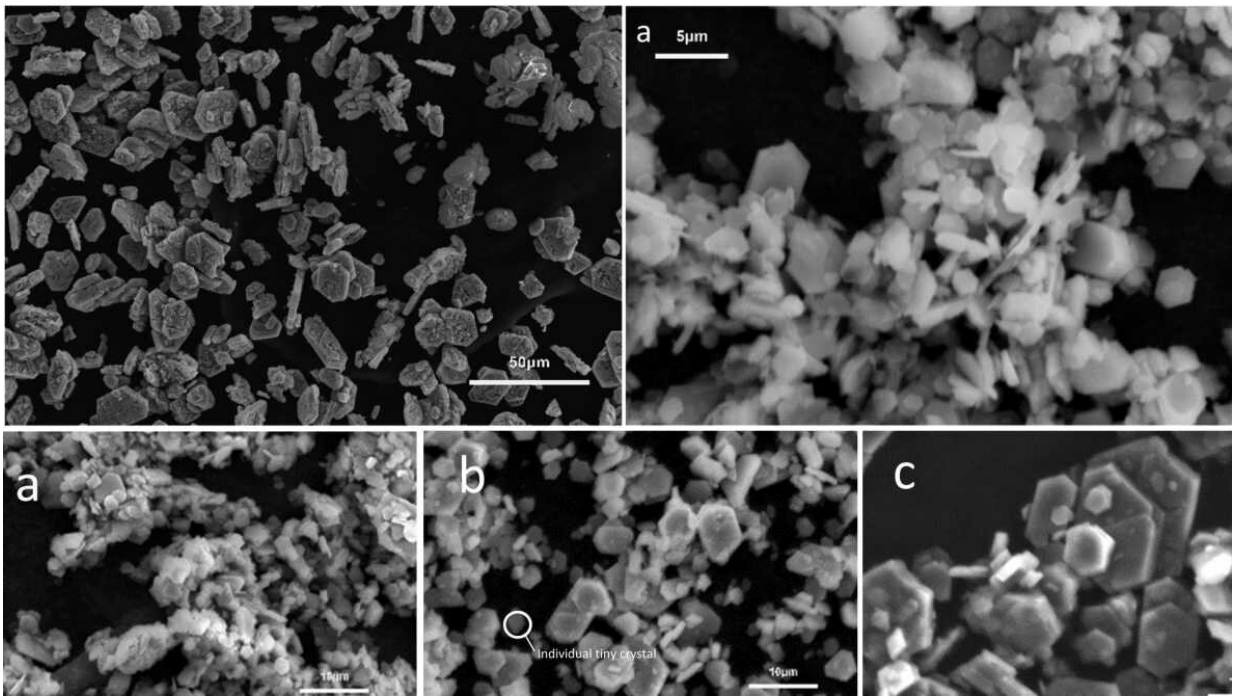

Magnified images of simonkolleite under different conditions and times. Credit: University of Sheffield

Greener processes for producing a crystalline component found in biomedicines as well as everyday skincare products and electronics have been developed at The University of Sheffield.

Researchers from The Department of Chemical and Biological

Engineering have published their findings in the journal *Nanoscale Advances* in a paper titled "Controlling simonkolleite crystallisation via metallic Zn oxidation in a betaine hydrochloride solution."

The research focused on a type of crystal known as simonkolleite, which helps zinc oxide (ZnO)—a metal by-product of many industrial processes—form into a perfect hexagonal shape. This shape is important for uses such as in the delivery of slow-release drugs as well as other applications which require a very specific type of crystal structure.

However, the current production of simonkolleite is not environmentally friendly due to the high temperatures required and toxic materials used.

The new research used a material called betaine in the production, which is an ionic liquid that can be extracted from plants, making it a cost-effective and more environmentally friendly option than the ammonia that is used normally.

That's because betaine has a much lower toxicity than ammonia, meaning it's also safer to use.

The process developed by the researchers is also easier than traditional methods, which requires the pH (i.e. how acidic or alkaline something is) to be controlled as well as very high temperatures.

The new process can be done at room temperature and without controlling the pH—which also helps benefit the environment as energy is not being used to raise the temperature.

Shaoqing Qu, a Ph.D. student in the department whose research is detailed in the paper, said, "I'm thrilled to have published this research detailing more sustainable methods of producing zinc oxide, which is so important to many industries. I'm now looking forward to completing

further research in this area as I continue my Ph.D."

The researchers are now exploring the use of other ionic liquids with an aim of improving the performance.

More information: Shaoqing Qu et al, Controlling simonkolleite crystallisation via metallic Zn oxidation in a betaine hydrochloride solution, *Nanoscale Advances* (2023). DOI: 10.1039/D3NA00108C

Provided by University of Sheffield