# Procedure for obtaining bimodal mesoporous materials based on silicon oxides using microwave radiation

## DESCRIPTION OF THE TECHNOLOGY

Mesoporous materials are widely used in different sectors due to their excellent properties related to high surface areas and modulable particle size. However, they have the disadvantage that their synthesis is slow and tedious, which usually involves long processing and/or aging times.

Moreover, in many cases their synthesis is not scalable to a larger quantity. Additionally, after obtaining them, they require a calcination stage lasting several hours to eliminate the surfactant that has been used as a directing agent in the formation of pores. This limits their profitability and commercial application. So far, the methodologies to remove the directing agent require acids, organic solvents or calcination in furnaces based on electrical resistances (magnetrons). However, there has not been so far a fast and simple synthesis method that is also able to completely calcinate the solid in a simple way and in a short time.

Researchers from the Universitat de València have developed a new ultrafast procedure for obtaining mesoporous materials by using microwave radiation from solid state sources, which solves the problems described above. From the application of this technology under well controlled conditions, bimodal mesoporous materials based on silicon oxides are obtained in a fast and homogeneous way.

## MARKET APPLICATION SECTORS

The invention can be applied in any sector using mesoporous systems, as for example in the pharmaceutical sector, food, agriculture and in the field of research. It can also be applied by companies currently marketing microwave chemical synthesis equipment based on a magnetron as a radiation source, as an improvement by replacing the source with a solid state source.

## TECHNICAL ADVANTAGES AND BUSINESS BENEFITS

The described procedure has the following advantages:

- Speed: Improvement of the time needed to prepare the materials.
- High homogeneity of the material obtained and reproducibility of results.
- Energy saving: Lower consumption of microwave radiation compared to alternative methods.
- Reduced investment cost: Lower cost of the equipment necessary to apply the procedure.

## CURRENT STATE OF DEVELOPMENT

The process has been scaled up with good results.

## INTELLECTUAL PROPERTY RIGHTS

The technology is protected through Spanish patent application P202031193, with the title "Procedure for obtaining bimodal mesoporous materials based on silicon oxides using microwave radiation" and priority date 27/11/2020.

## COLABORATION SOUGHT

- License agreement for use and exploitation.
- R&D project to advance development.

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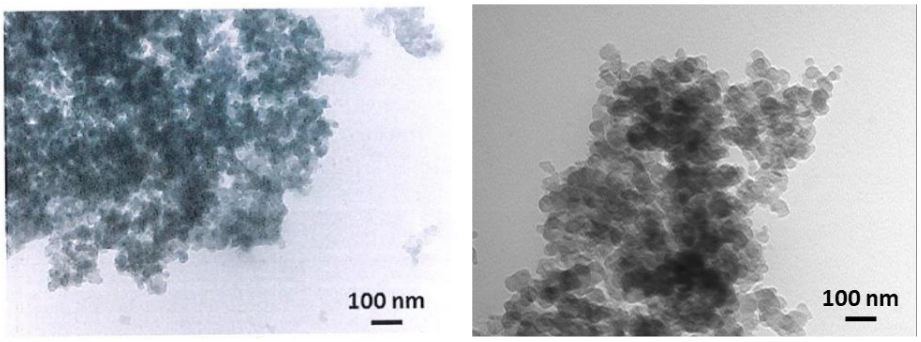


Figure 1: Mesoporous silicon oxide with bimodal pore system obtained according to patent-protected process

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