

Pharmaceutical application of mesoporous silicates

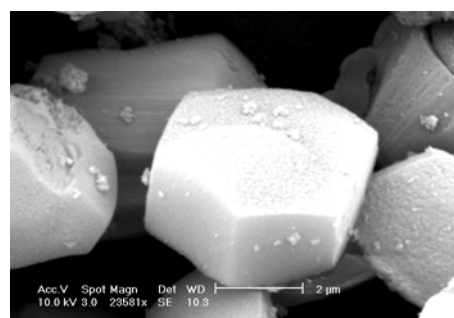
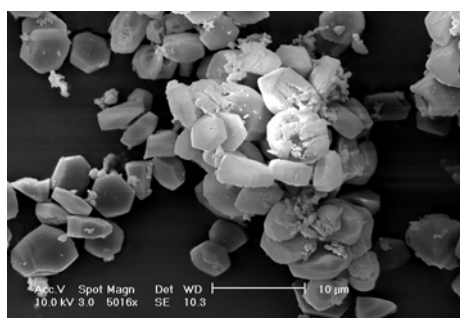
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Some possible pharmaceutical applications of mesoporous silicates, owing to the M41S family, have been investigated. These materials are characterized:

- by a great surface area;
- by the presence of pores with homogeneous size; in comparison to conventional mesoporous materials,
- by the possibility of controlling the pore sizes during their preparation.

These compounds can host in the pores biologically active molecules, which can be released in the proper moment.

The group is looking for industrial partners interested in further development and in the realization of a practical application.



Scanning electron micrographs of the mesoporous silicate MCM-41.

1. Description of the product

Mesoporous silicates are inorganic materials whose pores are from 2 to 50 nm.

Recently a class of mesoporous materials (M41S), characterised by an high superficial area, high adsorbent capacity and a narrow dimensional distributions of pores, have been synthesized. The project provides the realization of mesoporous materials with proper pore sizes and/or properly functionalized and the successive loading with biologically active molecules.

Possible pharmaceutical applications are:

- improving dissolution characteristics of poorly water-soluble drug and phyto-drug,
- modified drug release opportunely fixed to matrix,
- pre-formulative studies about solid formulations.

2. Innovative aspect of the product

In comparison to other agents used for improving apparent solubility of water poorly soluble drugs, such as cyclodextrins, it is possible to control the pore size and thus to obtain materials able to host drug molecules with relatively large size;

Some materials owing to M41S family, such as MCM-41, are suitable as agents for improving dissolution rate of poorly water soluble drugs. In fact they have unidirectional and parallel pores, lacking in tortuosity and micropores which could slow the drug diffusion.

The higher surface specific area (800-1000 m²/g) than that of colloidal silica such as aerosil®, permits a high contact surface between the solid and the biological fluids.

However they present a high adsorbent capacity of hydrophilic liquids such as exudates and humidity.

3. Main advantages of the offer

Improvement of bioavailability of poorly water soluble drug owing to the class 2 of the biopharmaceutic classification system, whose bioavailability depends on the drug dissolution rate. Realization of formulations with rapid onset of action. If speaking about industries interested in production of phyto-drugs and biocides, another advantage is represented by an improvement of employing techniques

4. Technology key words

Mesoporous silicates, adsorption, dissolution rate, water poorly soluble drugs, modified release

5. Current Stage of Development

Development phase – laboratory tested

6. Intellectual Property Rights

Project is not covered by patent

Technical and scientific publications

Valeria Ambrogi, Ione Chiappini, Giuseppe Fardella, Giuliano Grandolini, Fabio Marmottini, Luana Perioli. Microporous material from kanemite for drug inclusion and release. *Il Farmaco*, 56, 421-425 (2001).

V. Ambrogi, G. Fardella, G. Grandolini, M. Nocchetti, L. Perioli. Effect of hydrotalcite-like compounds on the aqueous solubility of some poorly water soluble drugs. *J. Pharm. Sci.*, 92, 1407-1418 (2003).

V. Ambrogi, F. Famiani, L. Perioli, F. Marmottini, C. Rossi. Effect of MCM-41 on the dissolution rate of the poorly soluble plant growth regulator, the indole-3-butyric acid. *Micropor. Mesopor. Mater.*, 96, 177-183 (2006).

V. Ambrogi, L. Perioli, F. Marmottini, L. Latterini, C. Rossi, U. Costantino. Mesoporous Silicate MCM-41 Containing Organic Ultraviolet Ray Absorbents: Preparation, Photostability and in Vitro Release. 7th International Conference of Solid State Chemistry 2006, Pardubice, Czech Republic, September 2006.

V. Ambrogi, L. Perioli, S. Giovagnoli, M. Marmottini, M. Esposito, C. Rossi, Improvement of dissolution rate of piroxicam by inclusion into MCM-41 mesoporous silicate, *Eur. J. Pharm. Sci.*, 32, 216-222 (2007)

V. Ambrogi, L. Perioli, F. Marmottini, O. Accorsi, C. Pagano, M. Ricci, C. Rossi, Role of mesoporous silicates on carbamazepine dissolution rate enhancement, *Micropor. Mesopor. Mater.*, accettato per la pubblicazione

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