Use of synthetic hydrotalcites to deliver molecules with biological activity

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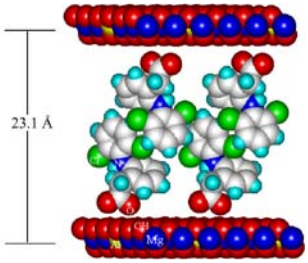
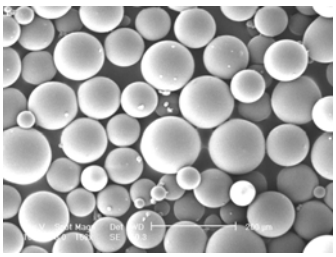
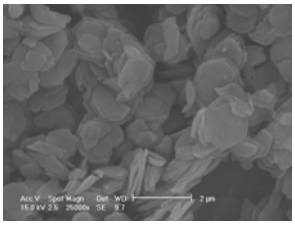
This research deals with the use of synthetic hydrotalcites, which are inorganic anionic layered solids, in order to introduce molecules with biological activity (drugs and sunscreens) into these matrices and to modify their delivery. These hydrotalcites (host) are able to intercalate anions (guest) between the layers (nanospaces) and then to release them as a consequence of a deintercalation process; moreover they can increase the guest stability and their protection range (in the case of sunscreen).



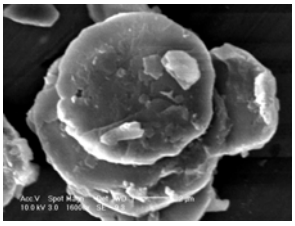
Computer generated representation of diclofenac intercalated between two hydrotalcite layers.



Microparticles containing intercalated diclofenac for colon delivery



SEM micrograph of intercalated eusolex



SEM micrograph of intercalated benzophenone

1. Description of the product

Synthetic hydrotalcites are inorganic anionic layered solids constituted by positive layers, whose positive charge is balanced by anions that lays into interlayer gallery and are exchangeable. When anion are molecules with biological activity the interlayer region is a micro vessel where we can store these molecules, conserve them and, by deintercalation process, control their release. The project involves, initially, the intercalation of not steroidal anti-inflammatories and sunscreens into the hydrotalcites. Successively the intercalation product can be used for the realization of proper formulations or systems, as microparticles for the colon release, mucoadhesive tablets for oral cavity, multi-phase tablets for an oral administration etc. In the case of sunscrens it is possible to prepare effective and safe solar cosmetic products suitable to improve sunscreen photostability and to avoid its direct contact with skin.

2. Innovative aspect of the product

The use of these matrices is innovative end gives advantages because:

- preparation is rather simple and cheap
- matrices are extremely versatile, are able to modify the release, are directly compressible; some of them have antacid action and improve stability of intercalated molecules. The use of hydrotalcites in "solar" formulations is a new protection model and offers many advantages such as sunscreen stabilization, increase of absorption of ultraviolet lights (UV-A and UV-B), absence of a close contact between skin and filter with

the consequent elimination of allergy problems, revaluation of old molecules, not expensive, currently not used.

3. Main advantages of the offer

Thank to the use of these matrices it is possible to realize formulation of not steroidal anti-inflammatory suitable for therapies of pathologies connected to colon and small intestine's inflammations, colon drug release, inflammation's therapy of oral cavity, oral multi-phase tablets' administration which consent a immediate and delayed release and, in the case of sunscreens, effective and safe UV protection.

4. Technology key words

Inorganic matrices, intercalation, nanocomposite, formulations

5. Current Stage of Development

Development phase – laboratory tested

6. Intellectual Property Rights

The product of the research is not covered by patent

Technical and scientific publications

L. Perioli, V. Ambrogi, B. Bertini, M. Ricci, M. Nocchetti, L. Latterini, C. Rossi.Anionic clays for sunscreen agent safe use: photoprotection, photostability and prevention of their skin penetration. Eur. J. Pharm. Biopharm. 62, 185-193 (2006).

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