

Applied Clay Science

Layered double hydroxides: An advanced encapsulation and delivery system for cosmetic ingredients-an overview

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Abstract

Topical delivery of active ingredients is very challenging because of the complex structure and excellent barrier properties of human skin. Advances in nanotechnology resulted in nanomaterial based delivery systems to augment the skin absorption of hydrophilic, hydrophobic and high molecular weight molecules. Nanostructured layered double hydroxides (LDH), owing to its exceptional features; such as large surface area, expandable interlayer space to accommodate active molecules, biocompatibility, high water holding efficiency, rheological and swelling properties, as well as cost effectiveness, have been proposed as innovative carriers of active ingredients for its effective transfer through skin. This is achieved by altering the active molecule release profiles, improving the stability of the active, increasing the solubility and bioavailability. This article intends to give an outline of recent research efforts in the development pertaining LDH based advanced skin delivery systems for cosmetic ingredients, the associated challenges and future perspectives. Special consideration is dedicated to the functionalities of LDH and its prospects in controlled release for cosmetic ingredients. The examples and discussions illustrating the application of LDH in topical delivery are centered around UV protection, skin care and antimicrobial properties.