Encapsulation and Nanodelivery of Active Molecules via Sustainable Reticular Materials

Mohd Basyaruddin Abdul Rahman[1,2,3]

[1]Integrated Chemical BioPhysics Research, Faculty of Science, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

[2]Department of Chemistry, Faculty of Science, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

[3]Foundry of Reticular Materials for Sustainability (FORMS), Institute of Nanoscience and Nanotechnology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

Abstract

Applications of advanced materials as the novel supporting matrix for molecules and biomolecules encapsulation have engendered incredible interest in the chemical and biotechnology communities. Robust nanostructured forms possess a high surface area and micropores that can cause a high loading and facilitate stability. Lately, nanomaterials especially reticular materials have been used in the targeted nanodelivery of therapeutics and diagnostics to diseased tissues. Metal-organic frameworks (MOFs) and zeolitic imidazolate frameworks (ZIFs) were used for nanodelivery purposes to encapsulate drugs in lung cancer pulmonary treatment. New biodegradable Ca-based MOFs were synthesized and encapsulated with fungicides for combating the fungal pathogen *Ganoderma boninense*. Molecular simulation of molecules or enzymes encapsulated and behaving in reticular materials may offer a better understanding of the design of future reticular materials. The selection of appropriate support materials with tailored properties is critical for the anticipated application and future investigations should endeavour to adopt logistic and sensible entrapment techniques. These could provide new perspectives to the industrial sector.