

Metal-Organic Frameworks for Innovative Functional Textiles

Authors : Hossam E. Emam

Abstract : Metal-organic frameworks (MOFs) are new hybrid materials investigated from 15 years ago; they synthesized from metals as inorganic center joined with multidentate organic linkers to form a 1D, 2D or 3D network structure. MOFs have unique properties such as pore crystalline structure, large surface area, chemical tenability and luminescent characters. These significant properties enable MOFs to be applied in many fields such like gas storage, adsorption/separation, drug delivery/biomedicine, catalysis, polymerization, magnetism and luminescence applications. Recently, many of published reports interested in superiority of MOFs for functionalization of textiles to exploit the unique properties of MOFs. Incorporation of MOFs is found to acquire the textiles some additional formidable functions to be used in considerable fields such like water treatment and fuel purification. Modification of textiles with MOFs could be easily performed by two main techniques; Ex-situ (preparation of MOFs then applied onto textiles) and in-situ (ingrowth of MOFs within textiles networks). Uniqueness of MOFs could be assimilated in acquirement of decorative color, antimicrobial character, anti-mosquitos character, ultraviolet radiation protective, self-clean, photo-luminescent and sensor character. Additionally, textiles treatment with MOFs make it applicable as filter in the adsorption of toxic gases, hazardous materials (such as pesticides, dyes and aromatics molecules) and fuel purification (such as removal of oxygenated, nitrogenated and sulfur compounds). Also, the porous structure of MOFs make it mostly utilized in control release of insecticides from the surface of the textile. Moreover, MOF@textiles as recyclable materials lead it applicable as photo-catalyst composites for photo-degradation of different dyes in the day light. Therefore, MOFs is extensively considered for imparting textiles with formidable properties as ingeniousness way for textile functionalization.

Keywords : MOF, functional textiles, water treatment, fuel purification, environmental applications

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