BÖLÜM 6

Metal Organik Çerçeveler

Özge İNAL[1]

Giriş

Metal organik çerçeveler (Metal Organic Frameworks; MOF), çok dişli organik bağlayıcılarla (ligand, linker) birbirine bağlanan metal iyonları veya kümelerinden oluşan gözenekli malzemelerdir. Gözenekli yapıya sahip olmaları ve metal içeren düğümlerden organik bağlayıcılar kullanılarak yapılandırılmaları nedeniyle poröz koordinasyon polimerleri (Porous Coordination Polymers; PCP) veya sekonder yapı birimleri (Seconder Building Units; SBU) gibi isimlerle de bilinirler (1, 2). Bu gözenekli kristal yapılar tek (1D), iki (2D) veya üç (3D) boyutlu ağlardan oluşabilirler. PCP ile MOF arasındaki temel fark PCP ya da koordinasyon polimeri (CP) yapılarının 1D özelliğine karşılık MOF yapılarının nokta (0D), zincir (1D), film/tabaka (2D) ya da ağ (3D) şeklinde de bulunabilmeleridir. SBU ise MOF yapısının temelini oluşturan katı bir şablon olarak tanımlanabilir (3,4).

MOF türevleri gaz depolama, ayırma/saflaştırma, kataliz gibi amaçlar için, elektrot ve süperkapasitör olarak kullanılmaktadır. Günümüzde biyomedikal alanda MOF kullanımına yönelik araştırmalar artan bir ilgi görmektedir. MOF'ların fototerapide görüntüleme ajanı, özellikle kanser tedavisinde biyomolekül enkapsülasyonu, ilaç taşıyıcı sistem olarak ve teranostik alanda kullanımları bulunmaktadır (1, 2, 5,6).

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Sonuç

Kataliz, ayırma, gaz adsorbsiyonu, sensör gibi amaçlarla kullanılmaya başlayan metal organik çerçeveler, yüksek gözenekliliğe sahip geniş yüzey alanları, farklı uygulamalar için modifiye edilebilirlikleri, düşük toksisite gibi avantajları nedeniyle son yıllarda özellikle kanser tedavisinde taşıyıcı sistem olarak değer kazanmıştır. Günümüzde demir, çinko, zirkonyum gibi yüksek değerlikli, düşük toksisiteli iyonların biyolojik materyaller ya da etken maddeler ile hibrit yapı oluşturduğu biyoMOF ve nanoMOF sistemleri, kanser terapötikleri için salım sistemi olarak kullanımları veya kendi terapötik etkilerinin yanı sıra çeşitli görüntüleme sistemlerinde kontrast ajanı olabilmeleri nedeniyle teranostik yaklaşımda ve biyosensör, fototerapi gibi kombine tedavilerde kullanılmaktadır.

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