Optimizing Drug Delivery from Metal-Organic Frameworks Through Novel Synthetic and Analytical Techniques

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Abstract

The high storage capacities, synthetic modularity, and accessible surface chemistry of MOFs has led to their development as nanoscale drug delivery vectors.[1] I will present our latest breakthroughs in the development of novel synthetic methodologies and application of advanced analytical techniques to optimize MOFs for drug delivery.

I will describe new synthetic approaches to modify the surfaces of MOFs through bioconjugate chemistry to tune endocytosis routes,[2] cancer cell targeting,[3] and even organelle targeting.[4] I will detail the development of defect-loading of drugs to maximise cargo loading within MOF nanoparticles, including the invention of multivariate modulation to allow one-pot syntheses of Zr MOFs containing a cocktail of chemotherapeutics, and the subsequent enhancements in anticancer selectivity and efficacy.[5] I will also show how real-time in vitro monitoring allows elucidation of different drug release mechanisms from pore- and surface-loaded MOFs and their resultant time-dependent cytotoxicities.[6]

References

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