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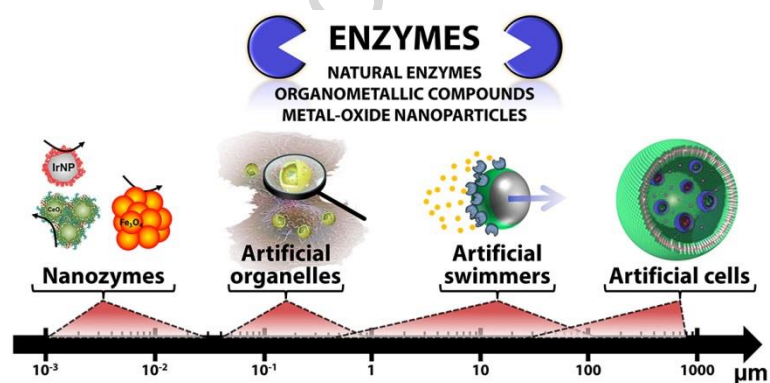
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### Abstract

Cell mimicry is a nature inspired concept that aims to substitute for missing or lost (sub)cellular function. This review focuses on the latest advancements in the use of enzymes in cell mimicry for encapsulated catalysis and artificial motility in synthetic bottom-up assemblies with emphasis on the biological response in cell culture or more rarely in animal models. Entities across the length scale from nano-sized enzyme mimics, sub-micron sized artificial organelles and self-propelled particles (swimmers) to micron-sized artificial cells are discussed. Although the field remains in its infancy, the primary aim of this review is to illustrate the advent of nature-mimicking artificial molecules and assemblies on their way to become a complementary alternative to their role models for diverse biomedical purposes.

### Graphical abstract



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