Self-Assembling Squaramide-Based Amphiphiles for Fragrance Encapsulation

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This research focuses on the synthesis and study of novel self-assembled materials, which may form structures such as vesicles, nanoparticles or gels, for fragrance encapsulation and release. The self-assembly process provides unique opportunities for designing materials for advanced applications, in this case, the controlled release of volatile molecules.
Fragrance delivery systems are of commercial interest as volatile scent molecules are used in variety of products, e.g. fabrics, cosmetics, perfumes and personal care products. By enabling precise control over release kinetics, improving physicochemical stability, and prolonging sensory perception, these systems can enhance the overall product performance and reliability. This drives the formulation innovations while addressing increasing consumer demand for prolonged efficacy and consistent, high quality sensory performance.
Recently, squaramides have been found interesting as versatile motifs in supramolecular self-assembly. These have provided a useful approach to developing nanoscale soft materials due to their structural versatility and the variety of potential self-assembled structures, such as micelles and vesicles.
In this research, squaramide-based amphiphiles are engineered to unlock long-lasting, controlled fragrance release. In this work, a versatile library of amino-acid-derived squaramide-based amphiphiles is explored to reveal how molecular design drives self-assembly, gelation and high-performance fragrance nanocarriers. We report studies DLS, UV, fluorescence, and surface tension measurements while the encapsulation and release of fragrance molecules is monitored by GC and HPLC.

Keywords:
Self-Assembly, nanoparticles, squaramide, amphiphiles, fragrance, encapsulation.