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Editorial

Theme: Preparation of Nano and Micro-structures for Drug Delivery
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Preparation of Nano- and Microstructures For Drug Delivery

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Numerous advances in pharmaceutical sciences and drug delivery have focused on nano- and microstructural aspects of dosage form development. These have been approached through engineering, chemical, and material perspectives and provide numerous opportunities to enhance therapeutic delivery using various administration routes. Progress on these scales has been far reaching; both in terms of application and also stage of formulation development, delivering significant and timely concepts on "miniaturised" scales. This thematic issue provides a broad coverage of developments focusing on numerous aspects of nano- and micron scale structures (properties, materials, and architectures) which may arise from common and emerging preparation methods. The guest editors would like to thank the authors for their contributions which were mainly driven by an EPSRC initiative focusing on emerging pharmaceutical technologies.

The thematic issue includes an example of modification to micro/nano-crystalline acetaminophen through binary polymeric mixtures and ultra-sonication to prepare particles up to 10 μm in size (Nokhodchi, 2017, DOI: 10.1208/s12249-016-0596-x). A separate study (Elkordy, 2017, DOI: 10.1208/s12249-016-0682-0) focuses on the *in situ* crystallisation of naproxen to yield microparticulate systems in conjunction with freeze-drying techniques. While both of the aforementioned preparation methods have been explored to an appreciable degree, an article focusing on the development of microencapsulated b-carotene via less common zeta-potential yield stress phenomenon is shown (Ghosal, 2017, DOI: 10.1208/s12249-017-0806-1). An emerging jet-based pharmaceutical technology, namely electrohydrodynamic atomisation, is used to prepare microparticles with multiple compartments (in Janus format) hosting multiple model compounds for chemotherapy (Williams, 2017, DOI: 10.1208/s12249-016-0638-4). The process is operational at the ambient environment and, like zeta-potential yield stress phenomena, provides a route for the preparation of sensitive API hosting microparticles. Smaller particles are also of great interest and importance to this theme, especially for applications targeting IV delivery. Using the same technique to prepare microparticles (Nokhodchi et al., 2017, DOI: 10.1208/s12249-016-0621-0) uses probe sonication to prepare both solid lipid nanoparticles and nano-structured lipid carriers which display enhanced solubility rates for poorly soluble spironolactone. Also focusing on lipid systems (Cai et al., 2017, DOI: 10.1208/s12249-016-0637-5) develops and characterises a nano-particle system to treat brain injury through efficient delivery of progesterone. The method they deploy in this instance is emulsion based, and their approach utilises quality-by-design implementation through a step-wise approach. Moving away from particulate systems, Das et al. demonstrate the importance of both material and engineering-based development of microneedles. In the first instance, the use of fish-scale polymer composites delivering lidocaine is shown (Das et al., 2017, DOI: 10.1208/s12249-017-0758-5). Furthermore, the impact of microneedle geometry is also elaborated using Rizatriptan (Das et al., 2017, DOI: 10.1208/s12249-016-0702-0). Both articles relate to importance of microstructure development (using naturally occurring microstructures and bio-polymers) for microneedle-based drug delivery. The final article in this thematic issue focuses on developments in porous materials as potential drug delivery systems (Ahmad et al., 2017, DOI: 10.1208/s12249-017-0740-2). The article provides a detailed review of progress to date with respect to inorganic materials on the micro- and nanometer scales.

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