Efficient recycling of polylactic acid nanoparticle templates for the synthesis of hollow silica spheres

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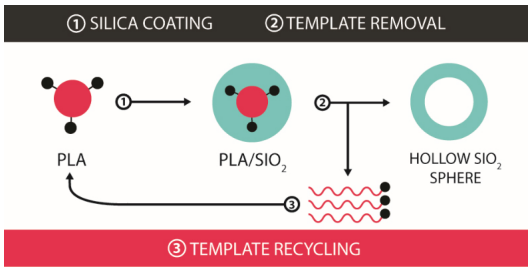
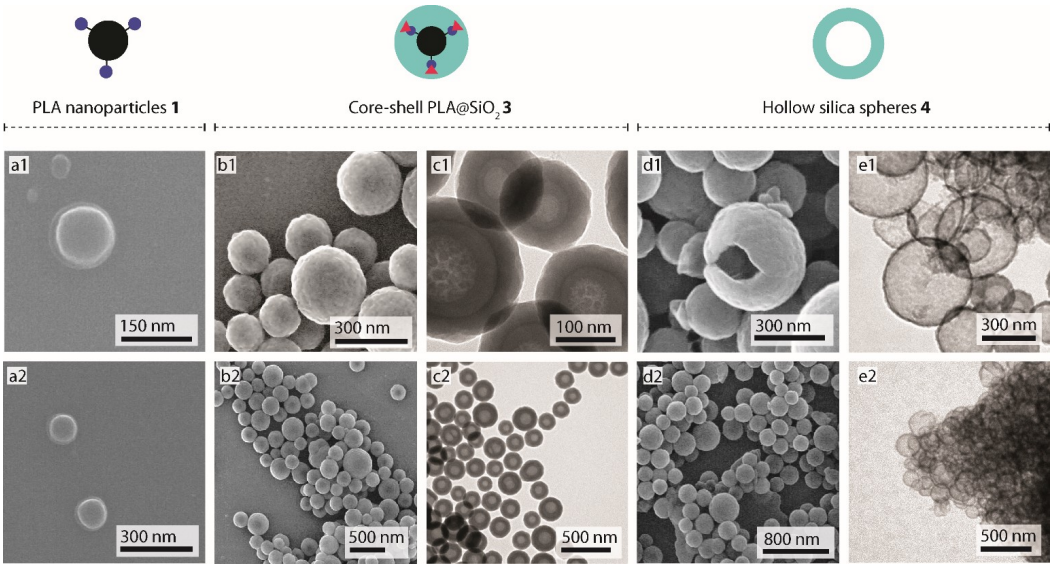
Hollow silica spheres can be obtained in a recycling process using bio-derived polylactic acid as a template, thus avoiding CO_2 emissions compared to standard processes using calcination for template removal.[1]



Herein, we present the first successful silica coating of polylactic acid nanoparticles, resulting in fully coated polylactic acid-silica core-shell nanoparticles. Subsequent dissolution treatment efficiently dissolved the polylactic acid core template and exclusively yielded hollow silica spheres with a shell thickness of 16 ± 1 nm. The collected polylactic acid could then be directly recycled from the template removal solution and re-used to synthesize polylactic acid nanoparticles for a next batch of hollow silica nanospheres. Such hollow particles are of interest in next generation insulation materials and as light weight fillers in polymers for fuel efficient mobility.



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