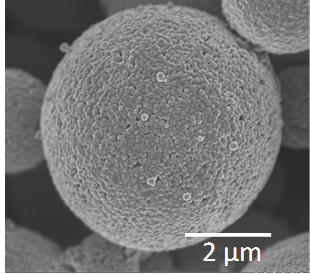
**Towards dual-purpose microcapsules with an impermeable shell**

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Polymer microcapsules are utilised as a carrier of active ingredients across a wide range of applications, including pharmaceuticals, agrochemicals, personal care, home care, foods and paints. Encapsulation is a popular mechanism to allow for protection of the active ingredient and for controlled release, however, due to the inherent permeability of a polymer shell, and despite recent advances, 1-2 such a material is unsuitable to retain small, volatile molecules for periods of time longer than a few days.

Recently, it has been demonstrated that growth of a continuous secondary gold shell onto polymer microcapsules can allow for complete retention of small molecules. 3 Gold shells are grown via an electroless deposition reaction using platinum nanoparticles adsorbed to the polymer microcapsule surface as catalytic loci for the reaction. However, gold is a precious metal and as such, whilst this secondary shell shows promise in preventing the age-old problem of capsule leakage, it is an expensive solution, lending itself only to high-end applications such as drug delivery.



*Figure 1 - Scanning electron micrographs showing a) gold shell microcapsules 4 and b) silver shell microcapsules.*

The work presented here explores the deposition of alternative shell materials to bring impermeable microcapsules to the wider market, using cost-effective materials whilst also capitalising on the material’s properties. For example we have found that platinum nanoparticles are able to catalyse silver shell growth, which presents the opportunity for antimicrobial microcapsules. We will present a number of examples of the shells we have explored and discuss control of the shell thickness and possible release mechanisms.

**References**

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