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From microcapsules of insect repellent to silica nanoparticles: Evolution in functionalization of textiles

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Abstract

The microencapsulation of substances for application to textiles started with fragrances in the 80s, and evolved to more sophisticated applications such as insect repellent, firstly based on fragrances that repel mosquitos, such as eucalyptus and citronella, and then incorporating substances such as DEET and permethrin. However, when applied to textiles, the microcapsules release their content prematurely during washing, making them very sensitive to washing conditions and generally not resistant to more than a few machine wash cycles. With silica nanoparticles, the durability is higher since the product is contained within it their pores and bound by H bonds in case of hydrophilic products such as hydrogen peroxide, and the nanoparticles do not break as in the case of microcapsules, as proven in previous work. Since they have antimicrobial properties, these products are useful for application on textiles such as hospital wear. To fix the nanoparticles to textiles a binder was used. The durability of washing was more than 25 washes. Like these other useful hydrophilic products can be incorporated into silica nanoparticles, with specific properties of interest to textiles such as products that may have insect repellent properties.In this work,one such product fitted the profile and was incorporated into the silica nanoparticles and applied to textiles. They were then tested for mosquito repellency and showed activity even after 10 washes. There was still active product present after 50 washes as determined by colorimetric tests. Results of repellency and durability to washing are presented.