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Cleansing of Surfactant-Coated Nanoparticles

A scalable, two-step process effectively and completely removes toxic cationic surfactants from metal nanoparticles, replacing them with a stable citrate coating for advanced manufacturing and nanomedicine applications.

Cationic surfactants, such as cetrimonium bromide (CTAB), are important for the scalable synthesis of metal nanoparticles, but also cause problems in dispersion stability and toxicity in subsequent applications. The leaching of toxic CTAB into a medium can occur over several months. The removal and replacement of CTAB is difficult to do without compromising the quality of the nanoparticle dispersions. Practitioners in the field typically functionalize CTAB-coated nanoparticles by simple physisorption or chemisorption, followed by centrifugation or dialysis. However, these methods do not guarantee complete CTAB removal.

Researchers at Purdue University have developed a method to completely remove cationic surfactants, like CTAB, without causing any adverse effect on the nanoparticles. This method involves two main steps. First, the nanoparticles are purified through several cycles of filtration and redispersion in cleansing solutions, and then, the CTAB is replaced with citrate through the same process using a sodium citrate solution. The citrate now acts as the stabilizing agent for the nanoparticles in subsequent manipulations and functionalization. The process is scalable and effective for future nanoparticle manufacturing needs such as metal nanoparticles for nanomedicine applications.

Advantages:

-Completely removes cationic surfactants without damage to nanoparticles

-Scalable for various manufacturing needs

Potential Applications:

-Cationic surfactant removal

Technology ID

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Category

Materials Science & Nanotechnology/Nanomaterials & Nanostructures

Pharmaceuticals/Computational Drug Delivery & Nanomedicine

Authors

Jonathan Mehtala

Alexander Wei

Further information

Dipak Narula

dnarula@prf.org

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-Nanoparticle manufacturing

-Nanomedicine

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