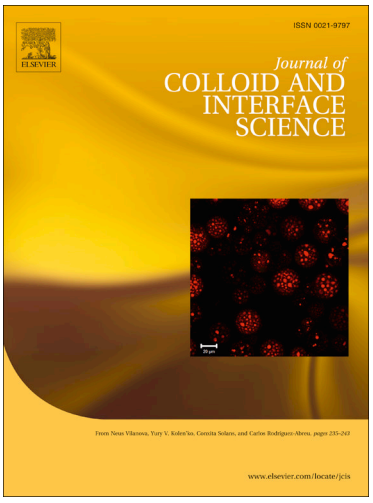

Regular Article

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Protective Composite Silica/Polyelectrolyte Shell with Enhanced Tolerance to Harsh Acid and Alkali Conditions

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ABSTRACT: Here we report a facile method to fabricate composite polymeric/inorgainc shells consisting of poly(allylamine hydrochloride) (PAH)/poly-(sodium 4-styrenesulfonate) (PSS) multilayers strengthed by the *in situ* formed silica (SiO_2) nanoparticles (NPs), achieving an enhanced stability under harsh acidic and basic conditions. While the unsiliconised PAH/PSS multilayers show a pH-dependent stability and permeability, the composite PAH/PSS/SiO_2 shells display significantly higher chemical tolerance towards a variety of harsh conditions ($1 \leq pH \leq 13$, high salinity). Upon treatment with either hydrochloric acid (HCl, pH=1) or 0.2 M ethylenediaminetetraacetic acid disodium salt (EDTA, weak acid, chelator), the $(PAH/PSS)_6/SiO_2$ shells are able to maintain the integrity of most calcium carbonate ($CaCO_3$) particles, as the shells are tickened and densified by sufficient SiO_2 NPs. When treated with NaOH solution at pH=13, the $(PAH/PSS)_6/SiO_2$ shells also display an intact morphology and maintain the ability to intercept rhodamin B (Rh-B) molecules, which is quite different to that observed with the unsiliconised $(PAH/PSS)_6$ shells. Ultrasound is