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NOVEL pH-RESPONSIVE NANOPARTICLES

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We report a new type of pH-responsive nanoparticles which have been prepared and investigated. Reversible nanoscale structures are formed in solutions of pH-sensitive polyelectrolyte - poly(N-methacryloyl-L-valine) or poly(N-methacryloyl-L-phenylalanine) and nonionic surfactant (Brij 98) in the presence of an hydrochloric acid. The influence of composition and pH on particles size and shape were investigated by a variety of methods. Analyses by DLS, SANS, and AFM (Fig. 1a) support the formation of nanoparticles and show a reversible transition (assembling-disassembling) in an aqueous solution by increasing or decreasing the acidity. An entity's size and polydispersity could be varied in a broad range making them a perspective candidate as a drug carrier. Unlike a typical micelle our results clearly indicate the presence of cavities in formed particles (Fig. 1b). For the first time we were able to examine and visualize these cavities. A hypothetical model of a nanoparticle and mechanism of formation have been proposed.

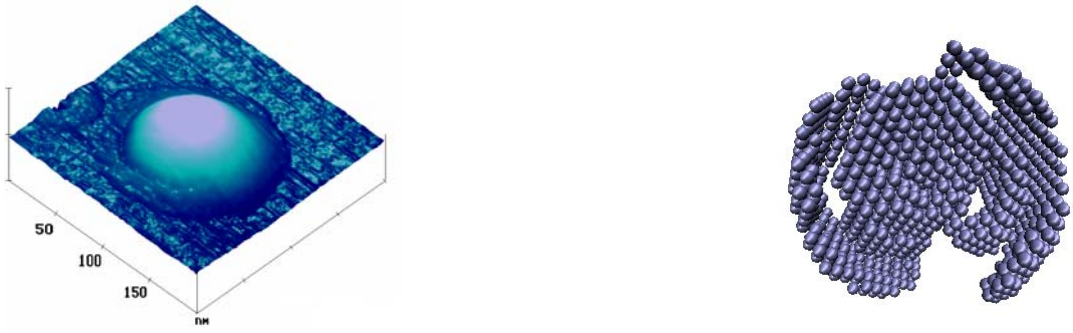

Fig. 1a AFM 3D height image (200 nm zoom); (b) A hypothetical nanoparticle structure modelled by DAMMIN.

Our experiments indicate that such particles could be attractive candidates for nanoscale drug-delivery applications by releasing their load on a pH change with a high sensitivity on the exact pH value.

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