pH-RESPONSIVE POLY(ALLYLAMINE)/DEXTRAN NANOCAPSULES: A VERSATILE PLATFORM FOR ENCAPSULATION AND DELIVERY OF BIOLOGICS

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Poly(allylamine) (PAH) polymers self-assemble into nanoparticles in phosphate buffer (PB), where phosphate ions act as ionic cross-linkers with primary amino groups. These polyamine phosphate nanoparticles (PANs) are stable at pH 6-8 and reversibly disassemble at more acidic or basic pHs. This pH responsiveness makes PANs suitable for intracellular use, as they are stable at physiological pH but disassemble in endosomes below pH 5.5 [1]. However, high concentrations of PANs are toxic due to the positive charges of the primary amines. To reduce toxicity and enhance biological material release, modifications with polyethylene glycol (PEG) [2] and oleic acid (OA) [3] have been designed and produced.
In the present work, the polysaccharide dextran (DEX) has been introduced in different proportions to the PAH backbone through a chemically controlled reductive amination approach. In the case of 1/1 PAH/DEX ratio, the polymer assembles as glyconanocapsules at PB concentrations above 5 mM. The chemical physical characterization, including cryo-EM, will be presented. As a proof of concept, the application of this glyconanosystem has been initially investigated for the delivery of a model protein, bovine serum albumin (BSA). Encapsulation and release of the BSA at acidic pHs has been examined by dynamic light scattering (DLS) and circular dichroism (CD) spectroscopy over different time intervals. Ongoing studies are investigating the cytotoxicity of this smart nanosystem, exploring its capability to encapsulate other proteins, such as lysosomal enzymes, and dextran-drive targeted delivery.

Key words: *Poly(allylamine), smart nanosystems, glyconanomaterials, pH-responsive, biologicals delivery*

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