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SYNTHESIS OF GLUCOSE RESPONSIVE HOLLOW CAPSULES

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During the past decades, a large variety of micro- and nanocarriers have been developed in order to improve efficiency, availability and toxicity profiles of drugs. In this field, stimuli-responsive polymer multilayers have attracted great scientific interest because of the potential applications in areas such as the controlled delivery or release of chemicals and drugs.

The objective of this work was to investigate the formation of glucose responsive hollow microcapsules (5 microns) composed of polyelectrolyte copolymers composed of carbohydrate-sensitive functions such as boronic acid and diols (PVOH) known for forming reversible covalent ether bond. So, in presence of carbohydrates such as glucose, the ether bonds will be reversibly broken and, consequently, the porosity of the glucose particles will change. Therefore, polyelectrolyte copolymers were synthesized by control radical polymerization, i.e. reversible addition-fragmentation chain transfer (RAFT, polyboronic acid) and cobalt-mediated radical polymerization (CMRP, PVOH). Using these polyelectrolytes as poly anions and poly(allylamine) (PAH) as a polycation, we undertook the formation of layer-by-layer capsules starting with a template of $CaCO_3$ microparticles which can be dissolve with EDTA leading to the formation of hollow microcapsules. Dextran isothiocyanate (dextran-FITC) was used to fill the $CaCO_3$ micropartilces and for determied the porosity of the resulting capsules in fonction of the glucose concentration. The sugar-dependent porosity is investigated by following the release of encapsulated dextran-FITC by spectro-fluoroscopy.