Compact Saloplastic Poly(Acrylic Acid)/Poly(Allylamine) Complexes: Kinetic Control Over Composition, Microstructure, and Mechanical Properties

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Résumé en anglais	Durable compact polyelectrolyte complexes (CoPECs) with controlled porosity and mechanical properties are prepared by ultracentrifugation. Because thestarting materials, poly(allylamine hydrochloride) (PAH) and poly(acrylic acidsodium salt) (PAA), are weak acids/bases, both composition and morphology are controlled by solution pH. In addition, the nonequilibrium nature of polyelectrolyte complexation can be exploited to provide a range of compositions and porosities under the infl uence of polyelectrolyte addition order and speed, and concentration. Confocal microscopy shows these “saloplastic” materials to be highly porous, where pore formation is attributed to a combination of deswelling of the polyelectrolyte matrix and expansion of small inhomogenities by osmotic pressure. The porosity (15–70%) and the pore size (< 5 μ m to > 70 μ m) of these materials can be tuned by adjusting the PAA to PAH ratio, the salt concentration, and the pH. The modulus of these CoPECs depends on the ratio of the two polyelectrolytes, with stoichiometric complexes being the stiffest due to optimized charge pairing, which correlates with maximized crosslinking density. Mechanical properties, pore sizes, and pore density of these materials make them well suited to three dimensional supports for tissue engineering applications.

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