

**Controlled complexation of metallic nanoparticles into polyelectrolyte multilayer thin films by manipulating crosslinking density and pH treatment**

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Layer-by-Layer assembled polyelectrolyte multilayer thin films (PEMs), which is based on alternating adsorption of cationic and anionic charged polyelectrolyte, offers an intriguing platform for the synthesis of various metallic nanoparticles. Among lots of polymeric pairs, linear poly(ethylenimine) (LPEI) and poly(acrylic acid) (PAA) of weakly charged polyelectrolytes system can be efficiently tuned in the intrinsic physical properties with varying external environment of the polyelectrolyte solution. In the case of Ag nanoparticles synthesis, size and distribution of Ag can be triggered with the post-assembly pH condition and the crosslinking density of LPEI/PAA PEMs, which further affect the electrical properties of the Ag complexed PEMs matrix. Finally, it is anticipated that this method can be utilized for various applications, such as in electronics, flexible devices, and biochip devices.