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Weak Polyelectrolyte-Clay Assemblies: Physical Mechanisms of Biological Response SVETLANA SUKHISHVILI, SVETLANA PAVLUKHINA, IRYNA ZHUK, Department of Chemistry, Chemical Biology and Biomedical Engineering, Stevens Institute of Technology, Hoboken, New Jersey 07030 — We report on a highly efficient, non-leachable antibacterial coating, consisting of an ultrathin nanocomposite hydrogel capable of hosting, protecting and delivering antibiofilm agents in response to bacterial infection. Constructed using layer-by-layer (LbL) deposition of clay nanoplatelets and a weak polyelectrolyte and loaded with an antimicrobial agent (AmA), the coatings was highly resistant to colonization by *Staphylococcus aureus*. The high antibiofilm activity of the coating results from a combination of highly localized, bacteria-triggered AmA release and hydrogel swelling, as well as retention of AmA by clay nanoplatelets. We discuss the dependence of rheological and swelling properties of weak polyelectrolyte-clay assemblies on film thickness, clay platelet orientation and environmental pH.

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