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**Super Gas Barrier Thin Films via Layer-by-Layer Assembly of Polyelectrolytes and Clay** MORGAN PRIOLO, DANIEL GAMBOA, JAIME GRUNLAN — Thin composite films of branched polyethylenimine (PEI), polyacrylic acid (PAA) and sodium montmorillonite clay (MMT) platelets were prepared using layer-by-layer assembly. Film thickness, mass deposited per layer, and barrier were shown to increase exponentially with the number of deposition cycles. After 32 layers (i.e., eight PEI/PAA/PEI/MMT quadlayers) are deposited, the resulting transparent film exhibits an oxygen transmission rate below the detection limit of commercial instrumentation ($< 0.005$ $cm^3/m^2 \cdot$ day). This level of oxygen barrier is believed to be due to a nano-brick wall microstructure comprised of exfoliated clay bricks in polymeric mortar, where the enhanced spacing between MMT layers, provided by PEI and PAA, creates channels perpendicular concentration gradient that delay the permeating molecule. These films are good candidates for flexible electronics, food, and pharmaceutical packaging due to their transparency, super gas barrier (that rivals SiOx) and lack of metal.

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