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Flame Suppression of Cotton with Polymer-Clay Thin Film Assemblies[1] GALINA SUKHONOSOVA, YU-CHIN LI, JAIME GRUNLAN, Texas A&M University — Cotton fabric was treated with flame-retardant coatings composed of branched polyethylenimine (PEI) and montmorillonite (MMT), prepared via layer-by-layer (LbL) assembly. Four coatings were created with solutions of BPEI (pH 7 or 10) and MMT (0.2 or 1 wt. %). The thickness and composition of the coatings were studied by ellipsometry and quartz crystal microbalance. PEI at pH 10 produces the thickest films. Each coating recipe was evaluated at 5 and 20 bilayers. Thermogravimetric analysis showed that coated fabrics left 13 % char after heating at 500 $^{\circ}$C, over an order of magnitude more char than from uncoated fabric, with less than 4% coming from the coating itself. Coating reduced afterglow time by 9 seconds in vertical flame tests. Post-burn chars of coated fabrics were examined by scanning electron microscopy, revealing that weave structure and fiber shape in all coated fabrics were preserved through burning. This is the first study of its kind to use layer-by-layer assembly to generate a flame retardant coating on a complex substrate like cotton fabric.

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