Paper-Based Flexible Lithium-Ion Batteries

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Paper-based flexible batteries have a wide range of applications in paper-based platforms, including in paper electronics, packaging, product displays, greeting cards, and sensors. This poster will present lithium-ion batteries using flexible paper-based current collectors. These current collectors were fabricated from wood microfibers that were coated with carbon nanotubes (CNT) through an electrostatic layer-by-layer nanoassembly process. The use of paper-based current collectors provides flexibility and improved electrode adhesion. Electrodes were fabricated by casting thin layers of lithium titanium oxide, lithium cobalt oxide or lithium magnesium oxide on the conductive paper. Half-cell and full-cell devices were fabricated and tested. The results show that the presented batteries use reduced mass loading of carbon nanotubes (10.1 $\mu g/cm^2$) compared to CNT film based batteries. Experimental capacities of the half-cell devices were measured to be 150 mAh/g for lithium cobalt oxide, 158 mAh/g for lithium titanium oxide, and 130 mAh/g for lithium magnesium oxide. Device designs, fabrication processes of paper-based current collectors, electrodes, and batteries, and further experimental results, including solid electrolytes, will be presented.