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Effect of electron acceptor structure on stability and efficiency in polymer photovoltaics: a library approach[1] MICHAEL TRO, DAVID OPARKO, EMMA LEWIS, ALEXIS SARABIA, MAXWELL GIAMMONA, JUSTIN ISAAC, THORSTEINN ADALSTEINSSON, BRIAN MCNELIS, RICHARD BARBER, Santa Clara University — A commonly studied polymer photovoltaic system is prepared using a mixture of poly[3-hexylthiophene] (P3HT) as the electron donor and [6,6]-Phenyl C61 butyric acid methyl ester (PCBM) as the electron acceptor. We have prepared a series of PCBM analogs, making a variety of fullerene esters using commercially available primary alcohols. The first studies involved attaching an eight- or eighteen-carbon chain in place of the single carbon in PCBM. Solar cells made from these compounds exhibited improved lifetimes, motivating further exploration in the domain of possible attachments. We have now created a small library of these acceptor compounds and blended them with P3HT to prepare and measure solar cells. We collect current-voltage data over hours or days for each sample under ambient air conditions. These data provide not only the standard figures of merit, but also reveal the time dependence of these values. We have already observed significant differences between fullerene esters that are very similar in structure.

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