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**Correlating Thin-Film Radical Density with Charge Transport in Open-Shell Conducting Macromolecules** MARTHA HAY, ELIZABETH JERGENS, BRYAN BOUDOURIS, Purdue University — Within the class of radical polymers, stable open-shell species serve as the medium for charge transport by undergoing oxidation-reduction (redox) reactions. The kinetics of these reactions are rapid enough that they are not considered rate-limiting in the electronic interactions of these materials. Rather, the proximity of these radical sites is paramount as a synthetic handle. Unfortunately, controlling the density of radicals has proven challenging in radical polymer systems. Often radical functionality is imparted to a polymer, rather than polymerizing a radical-containing monomer unit. This can prove troublesome as longer reaction times, in the interest of higher radical functionality, can lead to the elimination of radicals. Thus, the consequential altering of the radical electronic interactions is not well understood. We have synthesized a series of polynorbornene-based radical monomers at controlled radical loadings such that the radical density was preserved from monomer to polymer synthesis. As such, we attribute any change in the macroscopic transport properties to a change in the spacing between radical sites. These results elucidate the role of radical site distribution on the electronic performance of nitroxide-based radical polymers.

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