Making the most of electrochromic materials

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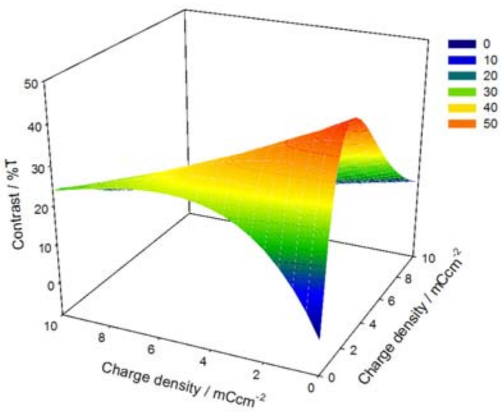
Electrochromic materials applications range from variable transmission devices (smart windows, antiglare rearview mirrors) to full color displays or smart camouflage skins [1-3]. No matter the application is, a primary aim for any of these devices is to show the maximum color variation possible. This will be reflected in broader transmission controlled ranges for smart windows or sharper clearer color changes for displays. Herein we present a method to fully characterize any electrochromic material, at any wavelength, as a function of its redox properties. Conditions to obtain the maximum contrast for a given material can then be easily identified. The method can be applied to multilayer configuration devices, resulting in a powerful tool for the optimization of electrochromic devices.



Contrast plot of a seven layer configuration electrochromic device, as a function of the redox charge of its electroactive constituent materials. Maximum contrast conditions are clearly identified. Results shown correspond to a poly-3,4-ethylenedioxy-thiophene (PEDOT)/ poly-3,6-bis(2-(3,4-ethylenedioxy)thienyl)-N-methylcarbazole (PBEDOT-NMCz) dual polymer system, at a fixed wavelength of 555 nm.

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[3] H. W. Heuer, R. Wehrmann, S. Kirchmeyer, *Advanced Functional Materials*, 12 **2002** 89 “Electrochromic Window Based on Conducting
Poly(3,4-ethylenedioxythiophene)Poly(styrene sulfonate)”