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Electronic performance of flexible single-wall carbon nanotube films: The role of electronic type JOHN M. HARRIS, North Dakota State University, STEVEN D. HUDSON , JEFFREY A. FAGAN, NIST, ERIK K. HOBBIE, North Dakota State University — Recent advances in the separation of single-wall carbon nanotubes (SWCNTs) by length and electronic type have made highly monodisperse SWCNT membranes a reality, opening up new realms of potential application in flexible electronics. By measuring the coupling between mechanical flexibility and electronic performance for thin transparent films of metallic and semiconducting SWCNTs assembled on elastic polymer substrates, we demonstrate a marked difference in the electronic manifestations of thin-film deformation for the two electronic SWCNT types. We relate these differences to mechanical and interfacial phenomena that stem from the distinct optical resonances characteristic of metallic or semiconducting nanotubes, and we evaluate the durability of each film type in response to repeated mechanical strain.

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