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Comment on "Fabrication of a Molecular Self-Assembled Monolayer Diode Using Nanoimprint Lithography"

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A recent paper[1] proposed a fabrication technique utilizing nanoimprint lithography to create nanometer scale structures for the study of the electronic transport properties of self-assembled monolayers (SAMs). Transport results on octadecanethiol SAMs (C-18) were presented as evidence; however, the reported conductivity is 6−8 orders of magnitude higher than those previously observed for alkanemonothiols by other research groups utilizing various characterization methods.[2−6] Alkanethiols are large HOMO−LUMO gap (HOMO: highest occupied molecular orbital, LUMO: lowest unoccupied molecular orbital) molecules with very short molecular lengths, thus the conduction mechanism is expected to be tunneling.[7] To verify a tunneling mechanism, temperature-dependent or length-dependent current−voltage measurements are generally recognized methods[2,8−10] to eliminate other defect-mediated transport processes. In the recent letter[1] none of the aforementioned characterizations were performed, and thus other nonmolecular transport processes (such as filamentary conduction) are possible. The paper's conclusions regarding the properties of alkanethiol monolayers, and the applicability of the process to study any thiol-based SAMs, are both premature claims. More careful characterization and analysis is necessary to validate these claims.

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