

Abstract Submitted  
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**Conduction via Spatially Extended Electronic States in Insulating Protein Fragments**<sup>1</sup> DAVID CARDAMONE, University of California, Irvine, GEORGE KIRCZENOW, Simon Fraser University — We explore the electronic structure and transport properties stemming from the one-dimensional periodicity inherent in the backbone of all proteins. Using a combination of ab initio and semi-empirical techniques, we show that, while protein molecules are normally insulators, this periodicity gives rise to extended states resistant to disorder and able to support strong electron transport. We predict that these extended states can be accessed experimentally by electrochemical gating, resulting in colossal enhancement of the conductances of nanoscopic protein fragments bridging metal electrodes and transforming them from insulators into one-dimensional conductors.

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