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Electron Transport in Short Peptide Single Molecules[1] JING CUI, Department of Physics, Columbia University, JOSEPH BRISENDINE, Department of Physics, The City College of New York, FAY NG, COLIN NUCKOLLS, Department of Chemistry, Columbia University, RONALD KODER, Department of Physics, The City College of New York, LATHA VENKARATAMAN, Department of Applied Physics and Applied Mathemathics — We present a study of the electron transport through a series of short peptides using scanning tunneling microscope-based break junction method. Our work is motivated by the need to gain a better understanding of how various levels of protein structure contribute to the remarkable capacity of proteins to transport charge in biophysical processes such as respiration and photosynthesis. We focus here on short mono, di and tri-peptides, and probe their conductance when bound to gold electrodes in a native buffer environment. We first show that these peptides can bind to gold through amine, carboxyl, thiol and methyl-sulfide termini. We then focus on two systems (glycine and alanine) and show that their conductance decays faster than alkanes terminated by the same linkers. Importantly, our results show that the peptide bond is less conductive than a sigma carbon-carbon bond.

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