

Abstract Submitted  
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**Constant-Speed Vibrational Signaling along Polyethyleneglycol Chain up to 60Å Distance** ZHIWEI LIN, IGOR RUBTSOV, Tulane University —

A series of azido-PEG-succinimide ester oligomers with a number of repeating PEG units of 0, 4, 8, and 12 (azPEG0, 4, 8, and 12) was investigated using a relaxation-assisted two-dimensional infrared (RA 2DIR) spectroscopy method. The RA 2DIR method relies on the energy transport in molecules and is capable of correlating the frequencies of vibrational modes separated by large through-bond distances. Excitation of the azido group in the compounds at ca. 2100 cm<sup>-1</sup> generates an excess energy which propagates in the molecule as well as dissipates into the solvent. We discovered that a part of the excess energy propagates ballistically via the covalent backbone of the molecules with a constant speed of ca. 550 m/s. The transport is described as a propagation of a vibrational wavepacket having a mean-free-path length of ca. 11Å. The discovery has the potential for developing new efficient signal transduction strategies for molecular electronics and biochemistry. It also permits extending the distances accessible in RA 2DIR structural measurements up to ca. 60Å.

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