



Ben-Gurion University of the Negev
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Can protein electronic conduction be a quantum effect?

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Abstract:

Solid state electron transport (ETp), electronic conduction across junctions with an ultra-thin protein film as an active layer, can be surprisingly efficient. Length-normalized, ETp efficiency can be similar to, or even exceed that of, conjugated molecules; moreover, it can be temperature-independent down to 4K. If contacts do not limit, i.e., intra-protein transport dominates, we cannot measure a transport barrier. Such results have, nowadays, the banner “quantum” all over them and, yes, they are surprising: the system is disordered, and protein electron transfer, ET, occurs at RT in solution and/or membranes, and is ion transport-coupled. Still, understanding ETp may have relevance for ET (replace coupling to the contacts by electron injection/extraction). I will show experimental data, ours^{1,2} and those of others, which help define the puzzle that we try to solve.

* work done with M. Sheves & I Pecht, A. Vilan, students & PDs at the Weizmann Inst., J. Blumberger, London; G. Vattay. Budapest; J C Cuevas, Madrid +++.

1 C. Bostick et al. Rep. Prog. Phys (2018); 2 N. Amdursky et al., Adv. Mater. (2014)

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