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What are 'molecular wires' and how might we use them?[1]

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Through-bond tunneling is generally greatly enhanced over through-space tunneling, so organic 'wires' can connect electrodes over distances with >nS conductance over distances of several nm. Very small decay lengths (or even non-exponential decay) suggest that mechanisms other than tunneling can contribute to transport. Wires made with electroactive (reducible/oxidizable) molecules can be gated electrochemically, and can be switched without any gate at all if the field owing to the applied bias is large enough, giving rise to switching and NDR. Wires that reconcile the competing requirements of flexibility (so they can be properly bonded) with high conductance will be useful elements in nanoscale devices and sensors.

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