Polymer materials with easily tailored electrical conductivity and especially with room-temperature superconductive properties would revolutionize our everyday life contributing to, among others, energy savings but also more efficient and widespread production of energy in e.g. flexible and portable photovoltaic, thermoelectric systems for efficient harvesting of thermal energy, or fabrication of energy-saving molecular electronics. While classical conductive (metals) or semiconductive materials exhibit typically isotropic conductance, proper design of polymer materials may lead to fabrication of ultrathin layers with nanometer scale thickness and anisotropic conductivity enabling efficient transport of charge carriers or phonons only in desired direction. Such properties, important for construction of ultimate photovoltaic systems and other optoelectronic devices, may be realized in polymer brushes composed of stretched macromolecules attached by one end only to a surface. However, typical polymerization methods are not compatible with surface grafting of conjugated polymer chains that would provide appropriate conductivity. Thus, advanced synthetic methodologies resulting in complex architectures of such brushes (e.g. ladder-like) will be proposed and addressed in this project to produce thin polymer layers with desired (semi)(photo)conductivity. The brushes obtained in this way will be examined in detail at the structural level and their properties will be determined. Attempts will be made to obtain one-dimensional superconducting systems, which were theoretically proposed 60 years ago, but are synthetically challenging and have not been tested so far.