Mimicking Nature, so taking inspiration from the (bio)matter which properties and resulting functions were evolving for millions of years, is one of the most effective strategies of research in materials science. Chirality is an inherent property of biomaterials, which in the simplest meaning states that the object is non-superimposable on its mirror image. Helices are great examples of chiral objects, which are created *e.g.* by biopolymers, complex macromolecules constituing living organisms, like proteins or DNA. Each helix possess two geometrical parameters, namely the twist (together with its chiral handedness) and the pitch of the helix, which in biological or synthetic soft matter systems, may be modulated by the external stimuli, like temperature, pH or the solvent effects.

Light, *i.e.* the flux of energy, is an alternative stimulus. It selectively interacts with chiral matter, in a sense that the helix reflects only part of the radiation. The properties of the reflected light are determined by the pitch of the helix and the clockwise or counterclockwise sense of the helix twist.

GOAL: The aim of the project lies in the understanding of the influence of the surface (bearing different surface energy), on the morphology and properties of helical supramolecular polymers. The goal is to verify if the structural features of the polymer nanostructures deposited on surface are capable to improve charge transport properties, or to generate enhanced interactions with light, further co-promoted by the 1D orientation of nanostructures.

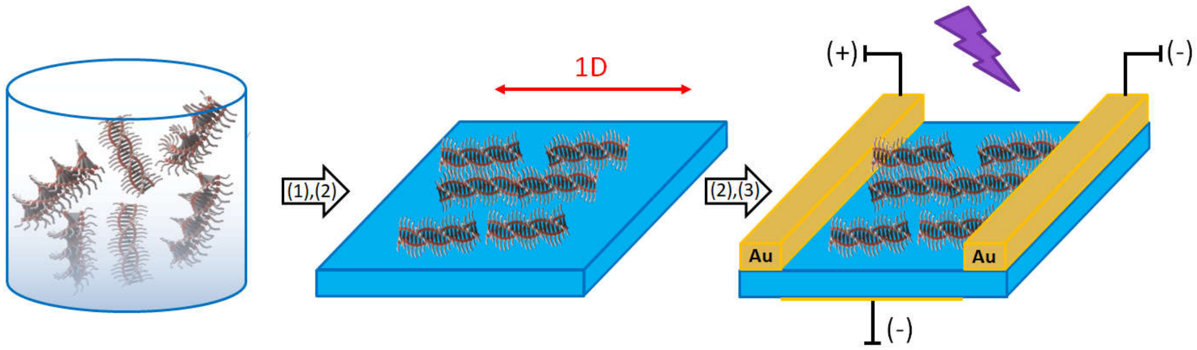

Fig. 1. Scheme of the concept of the project, starting from the noncovalent polymerization of supramolecular polymers in solution, followed by the controlled deposition on surface in order to achieve unidirectionally oriented nanostructures. The ultimate part of the project consists of the fabrication and testing of the optoelectronic devices containing the polymer (photo)active layer.

RESEARCH PLAN: In order to verify the hypotheses posted in the project, three research tasks will be realized: (1) development of the effective deposition methods of unidirectionally oriented polymer nanostructures onto solid substrates, (2) development of the complementary methodology of the analysis of the morphology (in micro and nano-scale) and the optical properties of the surface nanostructures, and (3) fabrication and characterization of the photoactive devices comprising the optimized chiral light-sensitive nanomaterials.

SIGNIFICANCE: Understanding of the processess behind the expression of chirality at the interface between the chiral material and the solid substrate is crucial from the point of view of realizing chiral surfaces, which are capable *e.g.* to selectively adsorb one of the enantiomers of the drug. Gaining knowledge about design of the supramolecular polymers, which helical on-surface structure will be known before their deposition on the surface, will lead to the development of a new class of smart materials. It will enable the polymer chemists to design the functional polymeric nanostructures, which besides their sensing properties connected with the chirality-selective interaction with light, will additionally possess another desirable features. These additional features are inherent to the dynamic systems like supramolecular polymers, and represent responsiveness for stimuli.