# Magnetization switching on self-assembled structure of alpha-helix-polyalanine molecules observed by ambient STM

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Polyalanine (PA) with an $\alpha$-helix conformation has gathered recently a lot of interest as the propagation of electrons along the helical backbone structure comes along with spin polarization of the transmitted electron. However, studies on a molecular scale are still rare, although this length scale provides direct insight into the role of molecular properties. We studied now in detail with STM the self-assembly of PA molecules on magnetic $Au/Co/Au/Pt/Al_2O_3$ substrates and probed the transmission by local spectroscopy (STS). Because of the high spatial resolution, our setup allows to study this CISS effect on the nanoscale and probe the importance of cooperative effects. By switching the out-of-plane magnetization of the heterostructure, the transport of electrons can be controlled depending on molecule's specific handedness. Furthermore, for various lengths of molecules with and without a cysteine termination, we studied the spin polarization in detail. The phase separation into well-ordered enantiopure hexagonal phases and hetero-dimer structures of the right (L) and left handedness (D) allow for the analysis of the spin polarization of PA molecules in different environments. Our results clearly demonstrate that both the coupling as well as the ordering and coordination are important in order to achieve a high spin-polarization in chiral systems.