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Towards dynamic measurements of individualized macromolecules

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Detailed insight into the dynamics and other functionalities of synthetic polymers on the molecular level is highly desired in advancing nano-technology; however, often, it can be technically challenging. We investigate the dynamics in individualized polymeric chains employing broadband dielectric spectroscopy (BDS). This method revealed altered dynamics under conditions of spatial confinement in the past; however, there is no detailed information about the extent to which the properties of the material change due to individualizing the polymer chains. To address samples of such a small scale, nano-dielectric spectroscopy is developed by refining a nanostructured electrode setup combined with a procedure of chemical surface modification. The latter involves depositing a very regular pattern of gold nanoparticles (AuNPs) of well-controllable size and separation on the nanometer scale. These AuNPs act as anchors for the chemical grafting of end-functionalized polymers (e.g., thiol terminated PEO). To determine the (average) number and conformation of chains grafted to each AuNP, their volume and shape are characterized by AFM.

Category

Other

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