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Electric field induced alignment of gold nanorods on surfaces WAQQAR AHMED, STEFAN KOOIJ, AREND VAN SILFHOUT, BENE POELSEMA, Solid State Physics, MESA+ Institute for Nanotechnology, University of Twente, P.O. Box 217, NL-7500AE Enschede, The Netherlands — We have studied the alignment of colloidal gold nanorods, deposited from solution onto well-defined substrates in the presence of an AC electric field generated by micrometer spaced electrodes. The field strengths employed in our experiments are sufficiently large to overcome the rotational and translation Brownian motion of nanorods. However, despite the large fields, we find that the degree of alignment is considerably smaller than what was previously reported for field-induced nanorod alignment in suspension. The limited alignment of nanorods is ascribed to the different experimental configuration, and the correspondingly larger density of nanorods. The mutual interactions of nanorods give rise to a disturbance of the local electric field and therewith their orientation. For sufficiently large field strengths, these interactions lead to the formation of nanorod chains that ultimately bridge the electrode gap. Furthermore, for small electrode spacing, the nanorods accumulate on the electrode surface, and the screening of their mutual interactions leads to considerably improved alignment.

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