Abstract Submitted
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van der Waals torque[1] RAUL ESQUIVEL-SIRVENT, Instituto de Fisica, UNAM, GEORGE SCHATZ, Department of Chemistry, Northwestern University — The theory of generalized van der Waals forces by Lifshtz when applied to optically anisotropic media predicts the existence of a torque. In this work we present a theoretical calculation of the van der Waals torque for two systems. First we consider two isotropic parallel plates where the anisotropy is induced using an external magnetic field. The anisotropy will in turn induce a torque. As a case study we consider III-IV semiconductors such as InSb that can support magneto plasmons. The calculations of the torque are done in the Voigt configuration, that occurs when the magnetic field is parallel to the surface of the slabs. The change in the dielectric function as the magnetic field increases has the effect of decreasing the van der Waals force and increasing the torque. Thus, the external magnetic field is used to tune both the force and torque. The second example we present is the use of the torque in the non retarded regime to align arrays of nano particle slabs. The torque is calculated within Barash and Ginzburg formalism in the nonretarded limit, and is quantified by the introduction of a Hamaker torque constant. Calculations are conducted between anisotropic slabs of materials including BaTiO3 and arrays of Ag nano particles. Depending on the shape and arrangement of the Ag nano particles the effective dielectric function of the array can be tuned as to make it more or less anisotropic. We show how this torque can be used in self assembly of arrays of nano particles. ref. R. Esquivel-Sirvent, G. C. Schatz, Phys. Chem C, 117, 5492 (2013).

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