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Optical properties and circular dichroism of chiral metal nanoparticles[1] ZHIYUAN FAN, ALEXANDER GOVOROV, Department of Physics and Astronomy, Ohio University, Athens, Ohio 45701, OU TEAM — In nature, biological systems are built up by homochiral building blocks, such as a sugar and protein. Circular dichroism (CD) is an effective tool of resolving molecular conformations. It utilizes circularly polarized light to detect differential absorption of chiral materials. In medicine, it will help us to develop new drugs and therapies, if we understand the connection between the physical or chemical properties of drug molecules and their conformations. With the rapid development of nanotechnologies, chiral nanomaterials attract lots of attention nowadays. CD signals of chiral molecules can be enhanced or shifted to the visible band in the presence of plasmonic nanocrystals. Here we present a plasmonic CD mechanism from a single chiral metal nanocrystal[1]. The mechanism is essentially different from the dipolar plasmon-plasmon interaction in a chiral NP assembly[2], which mimics the CD mechanism of chiral molecules. Chiral metal nanocrystals are expected to have promising applications in biosensing. Recently a few experimental papers reported successful realizations of chiral nanocrystals in a macroscopic ensemble in solution. Particularly the paper[3] described silver nanoparticles grown on chiral template molecules and demonstrating characteristic CD signals at a plasmonic wavelength. The plasmonic CD signals in Ref.[3] can come from a dipolar plasmon-molecule interaction or from a chiral shape of nanocrystals. [1] Z.Fan, et al. Nano Lett.,12, 3283 (2012). [2] A. Kuzyk, et al., Nature 483, 311 (2012). [3] B.Maoz, et al. J. Am. Chem. Soc.134, 17807 (2012).

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