Introduction to Chiral sensing

Q-Han Park

Director of Center for Electromagnetic Metamaterials

Department of Physics, Korea University, Korea

Abstract

A brief review of fundamentals and applications on metamaterial based chiral sensing is given. Chirality, a property of broken mirror symmetry, is hard to measure physically since broken symmetry is only a geometrical aspect. Enantiomers, pairs of same objects differing only by chirality, have the same fundamental physical properties such as mass or charge which makes them difficult to distinguish. However, things change drastically when chiral objects couple to light. We explain how chiral structures and chiral molecules interact with light carrying angular momentum, starting from quantum physics and Maxwell's equations, and how such chiral interactions lead to measurable quantities such as CD (circular dichroism) and ORD (optical rotary dispersion). We also review recent efforts on utilizing metamaterials and plasmonic platforms to achieve enhanced chiral sensing. The underlying principles of metamaterial/plasmonic enhancement of chiral sensing will be explained and realistic applications will be introduced.