A study of chirality and optical response of 2D chiral metamaterialsby

Huda Alzahrani[1*+], Tiehan Shen[1,2]

[1] Joule Physics Laboratory, School of Computing, Science and Engineering, Newton Building, University of Salford, Salford, M5 4WT, U.K.

[2] Director, Optimum Imaging Ltd, 6th Floor, Maxwell's Building, University of Salford, Salford, M5 4WT, U.K.

[*] *Presenting author-PhD. Student at Department of Materials and Physics.*

[+] *corresponding author, email: hudalzahr@gmail.com*

Abstarct:

There have been considerable interests in quantifying the chirality of structures, a significant material parameter, as most natural material possesses chiral characteristics. Chiral material is described as a substance that cannot be superimposed on its mirror image under any rotation or translation operation. Chiral material and its reflected form are known as enantiomers, the word enantiomer is originated from Greek, meaning opposite. In some cases, the interaction of light with the two enantiomeric (left-right) forms of the same structure yield different polarization changes. We try to identify the correlation between the chirality of planer metamaterials samples and the optical response experimentally.

A dual photo-elastic modulator (PEM) incorporate with lock-in amplifier techniques is used to measure the polarization states alteration. Subsequently, the polarization states are mathematically analyzed using Stokes parameters and Muller matrices. Furthermore, a dual PEM based Stokes polarimetric microscope, developed in-house, is used for the study the local polarisation states at the sample surface. The microscope provides quantitative measurements of the four Stokes parameters all Muller Matrix across the focusing plan. Using the Microscope offers the opportunity to characterize the polarization state enabling to extract more details at nanoscale samples.