Supporting information

Experimental Studies on Magnetization in Excited State by Using Magnetic Field Effect of Light Scattering Based on Multi-Layer Graphene Particles Suspended in Organic Solvents

*Lei He, Mingxing Li, Hengxing Xu and Bin Hu**

Department of Materials Science and Engineering, University of Tennessee-Knoxville,

Tennessee 37996, USA

1. Magnetic field effect of light scattering (MFE_{LS}) at normal condition: 45° in ground states

The MFE_{LS} was measured by recording the light scattering intensity as a function of a magnetic field from multi-layer fluorinated graphene (FG) flakes suspended in an organic solvent. The laser beam of 532 nm was used in light scattering experiments. The scattered light beam was detected primarily at the angle of 45° relative to the incident light beam (Fig. S1a). The magnetic field was linearly increased from 0 mT to 900 mT and then decreased from 900 mT to 0 mT. After each measurement, a small reverse magnetic field was applied to cancel any remaining magnetic field. The normal condition generates a positive MFE_{LS} signal.

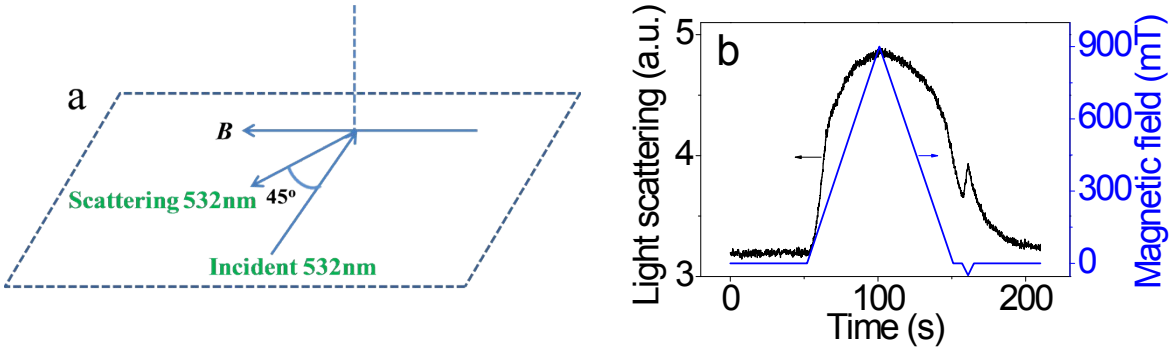

Fig. S1. a: Experimental configuration for MFE_{LS} measurements at normal condition with 45° between incident and scattered beams. b: Typical positive MFE_{LS} profile together with applied field profile at normal condition.

2. Magnetic field effects light scattering at perpendicular configuration: 90° in ground states

In the perpendicular configuration, the incident laser beam was applied from the top of liquid sample to illuminate the suspended FG flakes, as shown in Fig. S2a. The scattered light was measured perpendicularly to the direction of incident light beam, as shown in Fig. S2b. The perpendicular condition generates a negative MFE_{LS} signal (Fig. S2b), opposite to a positive MFE_{LS} signal generated by normal condition in light scattering.

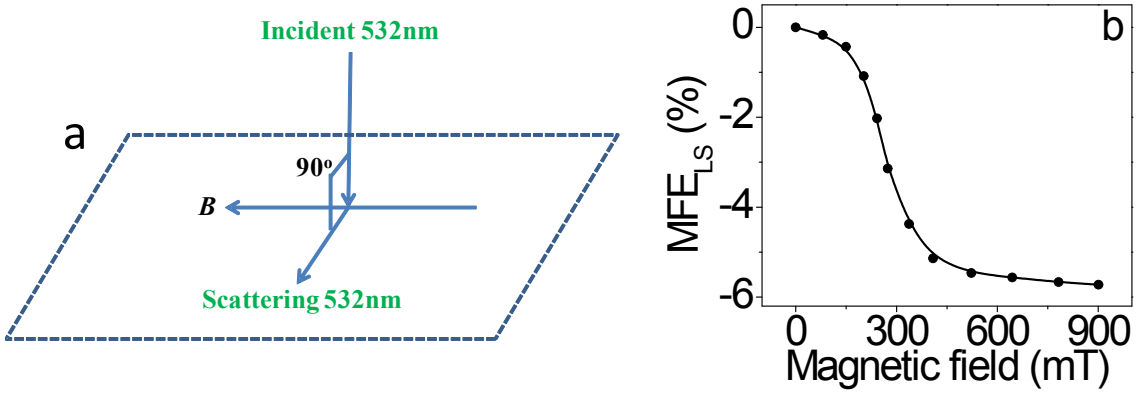

Figure S2. a: Experimental configuration for MFE_{LS} measurements at perpendicular condition with the 90° angle between incident and scattered beams. b: Typical negative MFE_{LS} signal from perpendicular condition.

3. Magnetic field effect of light scattering in excited states

The MFE_{LS} in excited states was measured by adding a photoexcitation beam of 325 nm into the light scattering experiments at normal condition (Fig. S3). The scattered beam of 532 nm was measured at 45° relative to the incident beam of 532 nm while the photoexcitation beam of 325 nm was applied. The scattered beam was recorded with and without the photoexcitation to show MFE_{LS} signals in both ground and excited states.

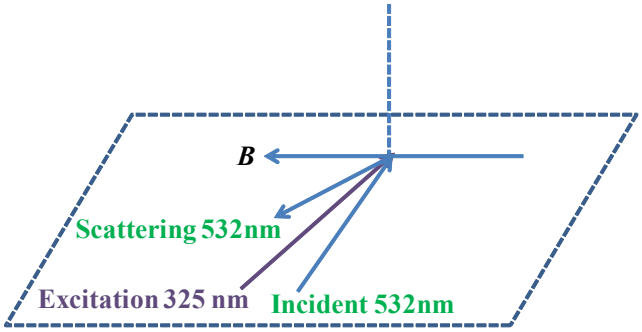

Figure S3. Experimental configuration for MFE_{LS} measurements in excited states at normal condition.