Surface Initiated Polymerizations From High Verdet Constant Nanoparticle: Spherical Polymer Brushes for Magneto-Optic Applications

Invention: Polymer-nanoparticle composite materials exhibit much higher Verdet constant performance than the currently-used inorganic metal oxide materials commonly referred to as “garnets,” such as terbium gallium garnet (TGG). While TGG has a Verdet constant of around 2000-3000 degrees/Tesla meter, the inventive materials have achieved a Verdet constant of 2500-27,000 degrees/Tesla-meter, representing a 10x enhancement over state of the art TGG material. The inventive materials are also more easily and cheaply processed, than the crystal growth methods required for garnets.

Background: Current high Verdet garnets are used for optical rotator-Faraday applications.

Applications:

- Optical isolaters, esp. for lasers
- Optical circulators, esp. for fiber optic communications or sensors
- Biomedical imaging

Advantages:

- High Verdet constant
- Able to tune Verdet performance
- Low cost and facile processability

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