APPLICATION OF THE TUNABLE REFRACTIVE INDICES OF MAGNETIC FLUIDS IN FIBER OPTICAL SWITCHES

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Due to the phase separation in the magnetic fluid film under external magnetic fields, the refractive index of magnetic fluids was found to be tunable with the varying field strength[1]. Through a careful inspection, the refractive index was observed to increase under a higher field. This result implies that the transmission between the core-cladding interface of a optical fiber can be manipulated by replacing the cladding with magnetic fluids and the intensity of the output light through the fiber can be changed by well controlling the external field. The experimental data show that the output intensity is reduced as an external field is applied, and the output intensity recovers when the external field is removed. This phenomenon is attributed to the variation in the refractive index of the magnetic fluid under external fields, and furthermore, layouts a promising opportunity to develop an optical fiber switch.

Fig. 1. Experimental setup for measuring the tunable refractive index of magnetic fluid films.

Fig. 2. Tunable refractive index of magnetic fluid with varying magnetic field for various film thickness.

[1] S.Y. Yang, Y.F. Chen, H.E. Horng, Chin-Yih Hong, W.S. Tse, and H.C. Yang, "Magnetically- modulated refractive index of magnetic fluid films", *Appl. Phys. Lett.*, **81**, 4931(2002).

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