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## Temperature sensitivity enhancement of the gold thin film-coated long-period fiber grating

Li Jian

Harbin Engineering University, China

Long-period fiber grating (LPFGs) have attracted considerable attention recently for many applications in fiber sensors. The LPFGs can measure various physical parameters, such as, temperature, strain, refractive index and curvature. In our work, we provide a method to enhance the temperature sensitivity of LPFG. We propose a new type of LPFG, using the filament heating method for measurement of temperature. The LPFG is composed of many micro-tapers, which were fabricated using a GPX-3000 glass processing system (Vytran Corp). By using the Vytran Corp, the heating element was kept fixed and the translation stages with fiber clamps were moved in the same direction with different velocities. We can control the relative moving velocity of the translation stages and the power of heating filament to fabricate different geometric profiles micro-tapers. We used a vacuum coating machine (JS-1600). The thickness of gold thin film increased from 0 nm to 100 nm, and then increased to 200 nm. We tested the temperature sensitivities of the LPFG at three film thicknesses, respectively. The LPFG was placed in a temperature control chamber to test the temperature response. When the environmental temperature increased from 22 to 222°C, the resonance wavelength had a red shift. The temperature sensitivity of the LPFG with no gold film is 48 pm/°C. The temperature sensitivities of the 100 nm and 200 nm gold thin film-coated LPFGs are approximately 71 and 67 pm/°C, respectively. We can enhance the temperature sensitivity of the LPFG by gold thin film-coated. The temperature sensitivity of the LPFG increases first and then decreases with the increase of gold film thickness, which is higher than the temperature sensitivity before coating.

### Biography

Li Jian received a Bachelor of Science degree from Harbin Engineering University in 2011 with major in Optical Information Science and Technology. From 2011 to 2014, he has worked at Foxconn Technology Group as a Photoelectric Equipment Development Engineer. Since 2014, he has been studying Master's in Optics from Harbin Engineering University. His research interests are fiber optics, fiber sensor and long-period fiber grating. He has published two papers in the Science Citation Index and presented at a conference of Society of Photo-Optical Instrumentation Engineers. He has been invited as a Speaker for the 5th International Conference and Exhibition on Lasers, Optics and Photonics which will be held during November 28-30, 2016 in Atlanta, USA.

lijianheu@sina.com

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