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Advanced fiber grating devices fabricated for all-optical signal processing

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A fiber grating is an optical fiber for which the refractive index in the core has a periodic or quasi-periodic perturbation profile. Fiber gratings can be created with various laser sources such as UV lasers (photosensitivity is required) and femtosecond lasers (no photosensitivity is required). Fiber grating technology has attracted considerable research interests in past two decades since it has wide applications in optical communications and sensing. Due to their natural compatibility, fiber gratings can serve as a perfect platform for all-optical signal processing in optical fiber communication systems. They can directly process optical signals in optical fiber without the need for coupling/re-coupling alignments required by bulk-optics or chip based devices, thus provide a low-loss, stable, cost-effective and ultra-fast solution for optical signal processing. Moreover, they can offer very strong design flexibility to achieve almost arbitrary spectral characteristics. Here we will report our recent progress on all-optical signal processing based on fiber grating technology. We will present fiber gratings designed and fabricated for optical differentiation, optical pulse shaping, optical format conversion and so on. The gratings were designed with layer-peeling method and fabricated with UV direct-writing technique. The performances of their use as optical signal processors were also evaluated experimentally.

Biography

Xuewen Shu has completed his PhD at the age of 27 years from Huazhong University of Science and Technology (HUST), China. He worked as a senior scientist at Aston University & Indigo Photonics Ltd, UK during 2001-2013. He is currently a full professor at HUST. He has published more than 150 papers in reputed journals and conferences. His research interests include fiber gratings, optical fiber communications, fiber lasers and optical sensors.

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