High-resolution Chalcogenide Fiber bundles for Thermal Image Delivery

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Ordered fiber bundles (FBs) operating in the mid-infrared spectral region are desirable for the collection and delivery of thermal images in extreme (e.g. under nuclear irradiation) or unfavorable environments (e.g. stray electromagnetic fields, in restricted spaces, etc.). In this paper, high-resolution chalcogenide FBs suitable for transmitting images in the 1.5-6.5 μm and 3-11 μm spectral ranges were prepared and characterized. Recently, The FB was composed of ~200,000 single fibers with a GeAsTeSe glass core of 15 μm in diameter and a polyetherimide (PEI) cladding of 16.8 μm in diameter. The fiber shows good transparency in the 3-12 μm spectral region. The resulting FB presents active area of ~79 % and a crosstalk of ~1 %. Clear thermal images of a human body were obtained using the FB, encouraging that it could be a promising prospect in fiber-optic thermal imaging in medical and industrial applications, in particular for endoscopic thermal imaging.

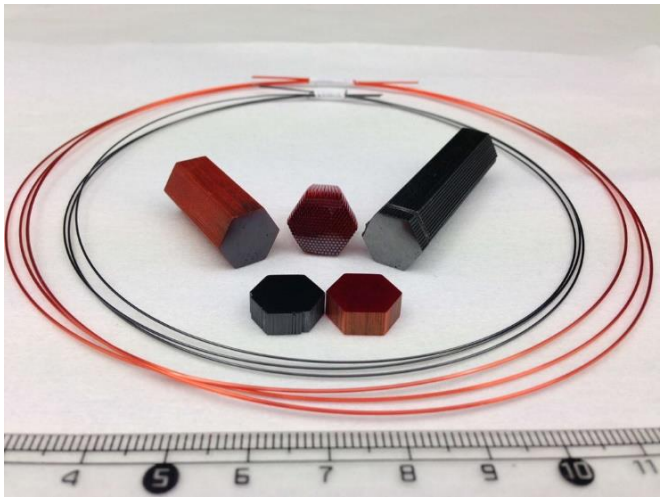

Figure 1: Chalcogenide fiber bundles fabricated at Jiangsu Key Laboratory of Advanced Laser Materials and Devices.