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FORWARD BRILLOUIN SCATTERING IN PHOTONIC CRYSTAL FIBER STIMULATED BY 1 μM BAND LIGHT SOURCE

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Nonlinear optical generation in photonic crystal fiber (PCF) can afford tunable radiation in non-conventional wavelength band that conventional laser source can not emit. During the nonlinear optical generation process, the situation always occurs that high power is confined in very small core region which leads to large gradient distribution of mode field. Hence tightly trapped acoustic wave in the cross-section direction is ready to be generated due to electrostriction. And it is named as guided acoustic wave Brillouin scattering (GAWBS) or forward Brillouin scattering. Recently, GAWBS in PCF pumped at 1.5 μm band or 1.8 μm band has been investigated in depth. However GAWBS pumped at 1060 nm band has not been reported yet. Parametric optical sources based on PCF pumped at 1060 nm band have shown its potential in the biological imaging application due to much larger tunability bandwidth compared with traditional laser source in this band. The GAWBS generation in PCF in this band need to be investigated in details since it is an unavoidable problem in the study of parametric light source operating in 1060 nm band. Here we investigate the GAWBS generation in PCF pumped at 1060 nm band for the first time to the best of our knowledge. A homemade PCF with small core diameter of about 2.4 μm and large air filling fraction in the cladding is used as optical-acoustic interaction medium. A Sagnac loop including a section of PCF in a asymmetric configuration is used to convert the phase modulation of light wave by the generated acoustic wave to intensity modulation. A homemade mode-locked Ytterbium doped fiber laser is used as the pump source. The output from the Sagnac loop is measured by a high speed real time oscilloscope. The measurement shows generation of GAWBS with the frequency of 1.23 GHz and lifetime of 120 ns.

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