Route-asymmetrical light transmission of a fiber-chip-fiber optomechanical system - DTU Orbit (09/11/2017)

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In this paper, we proposed and experimentally demonstrated a route-asymmetrical light transmission scheme based on the thermal radiative effect, which means that forward and backward propagations of an optical device have different transmittances provided they are not present simultaneously. Employing a fiber-chip-fiber optomechanical system, our scheme has successfully achieved a broad operation bandwidth of at least 24 nm and an ultra-high route-asymmetrical transmission ratio (RATR) up to 63 dB. The route-asymmetrical device has been demonstrated effectively with not only the continuous-wave (CW) light but also 10 Gbit/s on-off-keying (OOK) digital signals. Above mentioned unique features can be mostly attributed to the significant characteristics of the thermal radiative effect, which could cause a fiber displacement up to tens of microns. The powerful and significant thermal radiative effect opens up a new opportunity and method for route-asymmetrical light transmission. Moreover, this research may have important applications in all-optical systems, such as the optical limiters and ultra-low loss switches.

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