**InAs-nanowire-based broadband ultrafast optical switch**

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Indium arsenide (InAs) has attracted considerable interest in infrared optoelectronic and photonic devices. Here, we performed self-catalyzed growth of high quality InAs nanowires (NWs) on quartz by metalorganic vapor phase epitaxy (MOVPE) using a new isolated low-temperature growth regime (Fig. 1). We studied the ultrafast carrier dynamics and nonlinear optical responses of InAs NWs ranging from 1.0 to 2.8 µm and demonstrated the InAs-NW-based ultrafast broadband optical switch for passively Q-switching in all-solid-state laser systems (Fig. 2). Furthermore, we achieved ultrafast optical modulation for laser mode-locking at 1.0 μm, paving the way for NW applications in the field of ultrafast optics. These exotic optical properties indicate that InAs NWs have significant potential for various optoelectronic and photonic devices, especially in the mid-infrared wavelength range.

**Fig. 1. Optical and electron microscopy characterization of InAs NWs**



**Fig. 2. Laser diagnostics at 1.0, 2.0 and 2.8 μm, separately (a)-(c). Corresponding passive Q-switched pulse trains (d)-(f).**

**References**

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