

Copper nanowires based mode-locker for soliton nanosecond pulse generation in erbium-doped fiber laser

ABSTRACT

A mode-locked nanosecond Erbium-doped fiber laser (EDFL) based on copper nanowires (CuNWs) saturable absorber (SA) is successfully demonstrated in this article. The CuNWs were prepared by dissolving the CuNWs solution in a polydimethylsiloxane (PDMS) host polymer. Through the doctor blade technique, a free-standing CuNWs-PDMS film was formed. Upon inserting the film in a laser cavity, nanosecond pulses with a stable mode-locking was observed past the threshold pump power of 104.62 mW. The laser operated at the center frequency of 1.86 MHz and wavelength of 1563.3 nm. At the maximum available pump power of 187.04 mW, the 173 ns mode-locked pulse train achieved the highest pulse energy of 9.14 nJ and the maximum average output power of 1.703 mW. These results vindicate the capacity of the CuNWs film SA in producing nanosecond mode-locked EDFL in the 1550 nm region.

Keyword: Nanosecond pulse; Fiber laser; Copper nanowires