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标题: Ultrafast carrier response of Br<sup>+</sup>-irradiated In<sub>0.53</sub>Ga<sub>0.47</sub>As excited at telecommunication wavelengths

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摘要: We present results of infrared pump-terahertz probe experiments applied to a set of In<sub>0.53</sub>Ga<sub>0.47</sub>As films irradiated with heavy ions (Br<sup>+</sup>) at doses from 10(9) to 10(12) cm<sup>-2</sup>. Photoexcitation at 1400 nm (0.89 eV) allowed us to characterize the response close to telecommunications' wavelengths whilst avoiding the intervalley carrier scattering observed when a shorter wavelength excitation is used. The excitation fluence was varied in our experiments in order to characterize the dynamics in detail: the lifetimes and mobilities of both electrons and holes were retrieved, and the trap filling and carrier diffusion were clearly observed. The In<sub>0.53</sub>Ga<sub>0.47</sub>As film irradiated by the dose of 10(12) cm<sup>-2</sup> exhibits simultaneously ultrashort electron lifetime (similar to 300 fs) and very high electron mobility (2800 cm<sup>2</sup> V<sup>-1</sup> s<sup>-1</sup>). These findings are particularly important for the design of terahertz emitters controlled by lasers operating at standard telecommunication wavelengths. (C) 2012 American Institute of Physics. [<http://dx.doi.org/10.1063/1.4709441>]

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