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Distinct photoresponse in graphene induced by laser irradiation and interfacial gating.[1] WENHUI WANG, XITAO GUO, HAIYAN NAN, ZHENHUA NI, Southeast University, SPECTROSCOPY AND OPTOELECTRONICS GROUP TEAM — Graphene-based photodetectors have recently received much attention due to its unique optical and electronic properties. The photoresponse modulation plays a crucial role in the study of photocurrent generation mechanism and optoelectronic applications. Here, the tunable p-p+-p junctions of graphene were fabricated through simple laser irradiation process. Distinct photoresponse was observed at the graphene (G)-laser irradiation graphene (LIG) junction. Detailed investigation suggests that the photo-thermoelectric effect, instead of the photovoltaic effect, dominates the photocurrent generation at the G-LIG junction. On the other hand, the localized interface states, existing at the silicon dioxide/lightly doped Si interface, would induce an interfacial gating mechanism, which will enhance the photoresponsivity to 1000 A/W. More important, the photoresponse time of our device has been pushed to 400ns. The current device structure does not need a complicated fabrication process and is fully compatible with silicon technology. This work will open up a route to graphene-based high-performance optoelectronic devices.

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