**Optically controlled terahertz modulator by Formamidinium Lead Iodide (FAPbI3)**

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**Abstract:**

Solution-processed organic−inorganic hybrid halide perovskite has emerged as an excellent material for harnessing solar energy. Perovskites has strong photoresponsive properties that are used in solar cells, light-emitting diodes, infrared lasers and ultrafast photodetectors. Therefore, the perovskite terahertz modulators are received increasing attention. Formamidinium Lead Iodide (FAPbI3) has larger organic cations that can replace metal ions to form a more symmetrical crystal structure. In the meantime, FAPbI3 has a higher decomposition temperature and potential for improved stability. In this article, we experimentally demonstrate that the silicon- based perovskite terahertz modulator has excellent modulation capability and good stability. So the FAPbI3 terahertz modulator is an excellent new illumination-controlled terahertz modulator. As the external optical pump increases, the transmission gradually decreases, and significant light saturation occurs. In the case of high optical pump power, the terahertz transmission is less than 10%, showing excellent modulation.