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Elimination of susceptibility to acoustic and vibration noise of optical-acoustic transducers

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Optical-acoustic receivers (OAP) of radiation have an equivalent noise power (NEP) of 1.4×10^{-10} W/Hz$^{1/2}$ in the spectral range of 0.3–10000 μm. and do not require evacuation and thermal stabilization. The range of signals studied using the FDA covers both constant fluxes of IR and THz radiation with a power of up to 10^{-11} watts, temperature changes by 10^{-6}–10^{-7} K, and femtosecond terawatt laser pulses. The main disadvantage of PDA is its hypersensitivity to vibrations. It is shown that a flexible membrane acting as a pressure sensor is also an accelerometer in which the force acting on the membrane is determined by its inertial mass. Since single-layer graphene is the lightest structural material with a surface density of 0.77×10^{-7} g/cm^2, the use of a flexible membrane made of single-layer graphene reduces the susceptibility of the PDA to acoustic and vibration noise by more than three orders of magnitude without the use of any vibration protection devices.

Keywords: optical-acoustic transducer, threshold sensitivity, acceleration, accelerometer, flexible membrane, single-layer graphene, inertial mass.

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