

# Resonant absorption of electromagnetic signals in multilayer bolometric sensors

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We examine both experimentally and numerically the effect of resonant absorption of GHz signal in semiconductor layer in the presence of dielectric plate behind it. We use one and two identical dielectric plates and n-doped silicon semiconducting layer that has considerable absorption in GHz range. The obtained results demonstrate considerable enhancement of the absorption in the semiconductor plasma layer if the frequency of incident radiation nearly coincides with one of the resonator's eigenfrequencies. It is shown that by adding a second dielectric plate identical to the first one, one can change the resonator eigenfrequencies and, hence, control the position of absorption resonances in the definite frequency range. The conducted research proves the ability to increase the bolometric sensors efficiency significantly in quite an easy way. The results are urgent for the development of a recently proposed method for increasing the sensitivity of bolometric detection, which is based on the embedding of a dielectric substrate behind the sensitive element of the detector [1]. Despite the fact that the experimental results demonstrate the effect in the gigahertz range, corresponding method can be adapted to devices operating in THz and IR ranges.

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