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Title:Low-cost ultra-thin broadband terahertz beam-splitter

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Abstract:A low-cost terahertz beam-splitter is fabricated using ultra-thin LDPE plastic sheeting coated with a conducting silver layer. The beam splitting ratio is determined as a function of the thickness of the silver layer-thus any required splitting ratio can be printed on demand with a suitable rapid prototyping technology. The low -cost aspect is a consequence of the fact that ultra-thin LDPE sheeting is readily obtainable, known more commonly as domestic plastic wrap or cling wrap. The proposed beam-splitter has numerous advantages over float zone silicon wafers commonly used within the terahertz frequency range. These advantages include low -cost, ease of handling, ultra-thin thickness, and any required beam splitting ratio can be readily fabricated. Furthermore, as the beam-splitter is ultra-thin, it presents low loss and does not suffer from Fabry-Perot effects. Measurements performed on manufactured prototypes with different splitting ratios demonstrate a good agreement with our theoretical model in both P and S polarizations, exhibiting nearly frequency-independent splitting ratios in the terahertz frequency range.

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