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Design and experimentally measure a high performance metamaterial  
filter

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**Abstract:** Metamaterial filter is a kind of expecting optoelectronic device. In this paper, a metal/dielectric/metal (M/D/M) structure metamaterial filter is simulated and measured. Simulated results indicate that the perfect impedance matching condition between the metamaterial filter and the free space leads to the transmission band. Measured results show that the proposed metamaterial filter achieves high performance transmission on TM and TE polarization directions. Moreover, the high transmission rate is also can be obtained when the incident angle reaches to  $45^\circ$ . Further measured results show that the transmission band can be expanded through optimizing structural parameters. The central frequency of the transmission band is also can be adjusted through optimizing structural parameters. The physical mechanism behind the central frequency shifted is solved through establishing an equivalent resonant circuit model.

**Keywords:** metamaterials, pass-band, filter, impedance match

## 1. Introduction

In recent years, many metamaterial devices are carried out with unique

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