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Abstract: An electromagnetic crystals (EMXT) cavity filter with photonic band gap (PBG) structure is analyzed and a narrowband filter operating at around 0.5 *THz* is designed. The filter is simulated using the finite element method and it can be fabricated by micro-electromechanical systems (MEMS) technology, due to its low cost, high performance and high processing precision. The simulation results show the filter has a good performance. The passband bandwidth is 7%, the rejection at one time bandwidth out of the passband is larger than 30 *dB*, and the insertion loss in the passband is less than 1 *dB*.

Keywords: Terahertz, Cavity filter, PBG Structure.