

Abstract Submitted
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MEMS uniform non-magnetic heating device for miniaturized atomic magnetometer ZHI LIU, KAIFENG YIN, BANGCHENG HAN, School of Instrument Science and Opto-Electronic Engineering, Beihang University, HENG YUAN, BINQUAN ZHOU, XIANGYANG ZHOU, XIAOLIN NING, Research Institute for Frontier Science, Beihang University, JINGYI HE, YANG YANG, Hangzhou Innovation Institute, Beihang University — Miniaturized atomic magnetometer can be used for magnetoencephalogram source localization. The key technology of atomic magnetometer, vapor cell contained alkali metal atoms, requires a uniform temperature field to achieve superior sensitivity. In this study, ITO (Indium Tin Oxide) which is transparent and conductive is proposed as heating resistance wires to fabricate the heating films. A 300nm thick ITO film can transmit 95% of light without affecting the polarization state of the light. Consequently, the vapor cell can be heated in five surfaces to achieve the uniform temperature field without considering the impact to the optical path. According to the experimental results, the proposed heating films can achieve 200 degrees Celsius, which can support alkali metal atoms such as potassium and rubidium sufficiently. Furthermore, two ITO layers with the same shaped island by insulation layer that configures the current to double back on itself to reduce the magnetic field caused by heating current. In addition, in the condition of the input bias of 50kHz AC, low-frequency magnetic field noise can be reduced. The proposed MEMS uniform non-magnetic heating device can be used in atomic devices such as chip scale atomic magnetometer and gyroscope.

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