光学精密工程 » 2015, Vol. 23 » Issue (6): 1598-1604 DOI: 10.3788/OPE.20152306.1598

数字化微喷射技术制备聚合物薄膜电阻

杨利军, 陆宝春, 朱晓阳, 朱丽, 王洪成

南京理工大学 机械工程学院, 江苏 南京 210094

Fabrication of polymer thin film resistors by a drop-on-demand technology

YANG Li-jun, LU Bao-chun, ZHU Xiao-yang, ZHU Li, WANG Hong-cheng

School of Mechanical Engineering, Nanjing University of Science and Technology, Nanjing 210094, China

摘要 图/表 参考文献 相关文章 (6)

全文: PDF (1527 KB) RICH HTML NEW

输出: BibTeX | EndNote (RIS)

摘要 开展了微流体数字化技术制备聚合物薄膜电阻的研究.搭建了聚合物薄膜电阻按需喷射制备系统,将聚乙撑二氧噻吩/聚苯乙烯磺酸(PEDOT/PSS)聚合物以13.4%的最佳重叠率,按需喷射到RC(Resin-Coating)相纸表面,由聚合物液滴形成的薄膜在相纸表面毛细作用下迅速干燥形成薄膜电阻,并通过退火处理进一步降低薄膜电阻的阻值.实验研究了系统参量对聚合物液滴直径的影响,并通过改变薄膜电阻的行数、列数和层数以及退火处理的条件,制备了阻值为3.5～23.2 MΩ的薄膜电阻.实验显示薄膜电阻阻值和行数近似线性关系,并且随着制备列数和层数的增大而减小,退火处理可以使薄膜电阻的阻值降低10%～40%.以相同制备参数和退火条件制备的薄膜电阻具有较好的一致性,薄膜电阻的阻值随温度的升高而减小并趋于稳定.实验结果表明,基于微流体数字化技术制备聚合物薄膜电阻具有工艺简单、成本低廉、电阻电学性能优越等优点.

关键词 : 聚合物薄膜电阻, 微流体数字化, 按需喷射, RC相纸, 重叠率

Abstract : This paper focuses on the fabrication of polymer thin film resistors by the digitalization of microfluids. A fabrication system with drop-on-demand(DOD) jetting for polymer thin film resistors was setup based on the digitalization of microfluids. The poly(3.4-ethylenedioxythiophene)/poly(styrenesulfonate)(PEDOT/PSS) was jetted on the Resin Coating(RC) paper substrate at the best overlap of 13.4%, the film consisting of polymer droplets was quickly dried by the capillary action of the paper to form a thin film resistor and the resistance value was reduced by annealing processing. The influences of the system parameters on the diameter of the droplets were researched. The thin film resistors with the resistances varied from 3.5 to 23.2 MΩ were obtained by changing the row number, column number, layer number and the annealing conditions. The results show that the resistance is almost proportional to the row number and decreases with the number of the rows and layers increases. Furthermore, the resistance of the printed thin film resistors has decreased by 10%—40% due to the annealing processing. With the same fabrication parameter and annealing condition, the thin film resistors show good uniformity. The resistance of the resistors decreases when the temperature increases and reaches a stable level. The experimental results indicate that the fabrication of the polymer thin film resistors based on the drop-on-demand technology has advantages on the simple process, low costs and good electrical properties.

Key words : polymer thin film resistor microfluid digitalization drop-on-demand RC paper overlap

收稿日期: 2014-11-20

中图分类号: TM544

TP69

基金资助:国家自然科学基金资助项目(No.51175268,No.11102090);中国博士后科学基金资助项目(No.2014M551584);江苏省三维打印装备与制造重点实验室开放基金资助项目(No.L2014071302)

作者简介: 杨利军(1989-),男,江苏金坛人,博士研究生,2012年于南京理工大学获得学士学位.主要从事微流体-驱动控制技术及其应用、微机电、微流控芯片等方面的研究.E-mail:fulisayang@163.com

引用本文:

杨利军, 陆宝春, 朱晓阳, 朱丽, 王洪成. 数字化微喷射技术制备聚合物薄膜电阻[J]. 光学精密工程, 2015, 23(6): 1598-1604. YANG Li-jun, LU Bao-chun, ZHU Xiao-yang, ZHU Li, WANG Hong-cheng. Fabrication of polymer thin film resistors by a drop-on-demand technology. Editorial Office of Optics and Precision Engineering, 2015, 23(6): 1598-1604.

链接本文:

http://www.eope.net/CN/10.3788/OPE.20152306.1598 **或** http://www.eope.net/CN/Y2015/V23/I6/1598

服务

把本文推荐给朋友

加入我的书架

加入引用管理器

E-mail Alert

RSS

作者相关文章

杨利军

陆宝春

朱晓阳

朱丽

王洪成