Photolithographic fabrication of solid–liquid core waveguides by thiol-ene chemistry

Photolithographic fabrication of solid–liquid core waveguides by thiol-ene chemistry

In this work we demonstrate an efficient and cleanroom compatible method for the fabrication of solid–liquid core waveguides based on nanoporous polymers. We have used thiol-ene photo-grafting to tune and pattern the hydrophilicity of an originally hydrophobic nanoporous 1, 2-polybutadiene. The generated refractive index contrast between the patterned water-filled volume and the surrounding empty hydrophobic porous polymer allows for light confinement within the water-filled volume—the solid–liquid core. The presented fabrication process is simple and fast. It allows a high degree of flexibility on the type and grade of surface chemistry imparted to the large nanoporous area depending upon the application. The fabrication does not need demanding chemical reaction conditions. Thus, it can be readily used on a standard silicon lithography bench. The propagation loss values reported in this work are comparable with literature values for state-of-the-art liquid-core waveguide devices. The demonstrated waveguide function added to the nanoporous polymer with a very high internal surface area makes the system interesting for many applications in different areas, such as diagnostics and bio-chemical sensing.

General information
State: Published
Organisations: The Danish Polymer Centre, Department of Chemical and Biochemical Engineering, Department of Micro- and Nanotechnology, NSE-Optofluidics Group, NanoSystemsEngineering Section
Contributors: Sagar, K. S., Gopalakrishnan, N., Christiansen, M. B., Kristensen, A., Ndoni, S.
Pages: 095001
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: Journal of Micromechanics and Microengineering
Volume: 21
Issue number: 9
ISSN (Print): 0960-1317
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 2.02 SJR 0.554 SNIP 0.968
Web of Science (2017): Impact factor 1.888
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.74 SJR 0.63 SNIP 1.067
Web of Science (2016): Impact factor 1.794
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.96 SJR 0.687 SNIP 1.265
Web of Science (2015): Impact factor 1.768
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.84 SJR 0.802 SNIP 1.316
Web of Science (2014): Impact factor 1.731
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 1.74 SJR 0.737 SNIP 1.233
Web of Science (2013): Impact factor 1.725
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 1.92 SJR 0.936 SNIP 1.491
Web of Science (2012): Impact factor 1.79
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 2.43 SJR 1.036 SNIP 1.443
Web of Science (2011): Impact factor 2.105
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.013 SNIP 1.637
Web of Science (2010): Impact factor 2.281
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.144 SNIP 1.5
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.243 SNIP 1.616
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.422 SNIP 1.815
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.264 SNIP 2.098
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.165 SNIP 2.073
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.057 SNIP 1.881
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.416 SNIP 1.579
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.103 SNIP 1.507
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.763 SNIP 1.651
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.741 SNIP 1.011
Scopus rating (1999): SJR 0.742 SNIP 1.052
Original language: English
Keywords: Condensed matter: electrical, magnetic and optical, Electronics and devices, Nanoscale science and low-D systems, Chemical physics and physical chemistry, Surfaces, interfaces and thin films
DOIs:
10.1088/0960-1317/21/9/095001
Source: orbit
Source-ID: 280218
Research output: Research - peer-review › Journal article – Annual report year: 2011