Accounting for PDMS shrinkage when replicating structures - DTU Orbit (12/01/2019)

Accounting for PDMS shrinkage when replicating structures

Polydimethylsiloxane (PDMS) is a widely used material for fabrication of microfluidic devices and for replication of micro- and nanotextured surfaces. Shrinkage of PDMS in the fabrication process can lead to leaking devices and poor alignment of layers. However, corrections to the mold master are seldom applied to counteract the shrinkage of PDMS. Also, to perform metrological measurements using replica techniques one has to take the shrinkage into account. Thus we report a study of the shrinkage of PDMS with several different mixing ratios and curing temperatures. The shrinkage factor, with its associated uncertainty, for PDMS in the range 40 to 120 °C is provided. By applying this correction factor, it is possible to replicate structures with a standard uncertainty of less than 0.2% in lateral dimensions using typical curing temperatures and PDMS mixing ratios in the range 1:6 to 1:20 (agent:base).

General information
State: Published
Organisations: Department of Micro- and Nanotechnology, Polymer Micro & Nano Engineering, Dansk Fundamental Metrology A/S
Number of pages: 6
Pages: 127002
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Micromechanics and Microengineering
Volume: 24
Issue number: 12
ISSN (Print): 0960-1317
Ratings:
BFI (2019): BFI-level 1
Web of Science (2019): Indexed yes
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