

Forschungszentrum Karlsruhe in der Helmholtz-Gemeinschaft

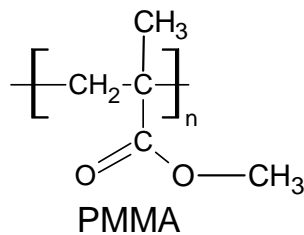
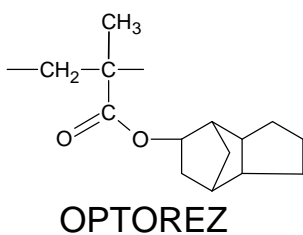
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UV-induced Modification of Polymer Surface to Obtain Cell Friendly Polymer Surface and to Fabricate Polymer Waveguides

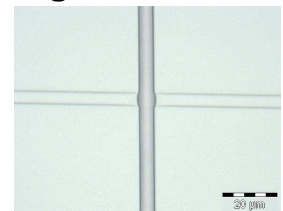
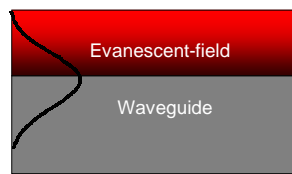
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We have investigated the deep-UV-induced refractive index modification of PMMA and alicyclic methacrylate copolymers (OPTOREZ-series) for realizing integrated optical circuits. The adhesion of living mammalian cells on the UV exposed polymer surface was also investigated for the application in biosensors.

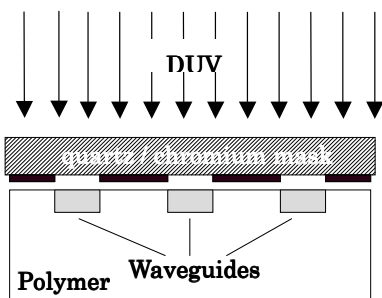
Motivation: In order to improve the chemical and physical properties of PMMA (low T_g, high water absorption etc.), we selected alicyclic methacrylate copolymers (OPTOREZ® Hitachi Chemical Co.,Ltd.).



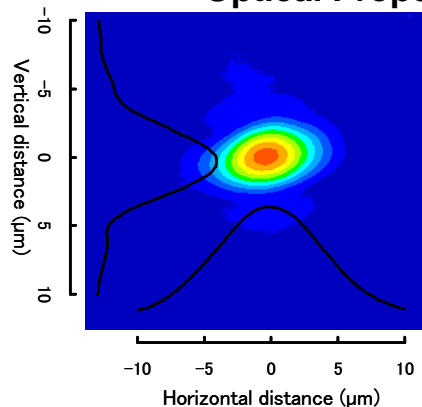
Biophotonic Integration



Waveguide Fabrication

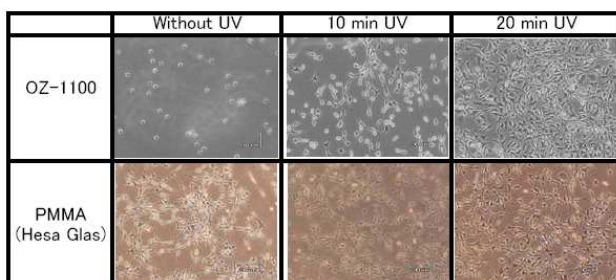


Optical Properties of Waveguide



OZ-1100
Waveguide loss :
1.5 dB/cm at 1550 nm
Fiber-chip coupling loss:
0.5 dB/facet
Single-mode at 1550 nm

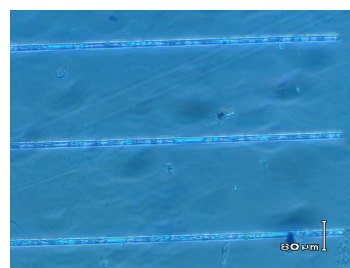
UV-induced Cell Adhesion



In air UV exposed and then L929 (Fibroblasts) with Pluronic F-68 cultured.

OZ-1100 showed the exposure dose dependent cell adhesion

Selective Cell Adhesion on Waveguide



L929 (Fibroblasts) with Pluronic F-68 cultured on OZ-1100 after washing and crystal violet staining

Literature

- [1] A. Welle et al., *J. Neurosci. Methods*, **142** (2005), 243-250.
- [2] D. G. Rabus et al., *Proc. of SPIE*, **6123** (2006), 61230I.
- [3] Y. Ichihashi et al., *Jpn. J. Appl. Phys.*, **45** (2006), 2572-2575.
- [4] Y. Ichihashi et al., *Proc. of SPIE*, **6183** (2006), in press.