EUREKA PROJECT > E! 3892 MODPOLEUV

MODIFICATION OF POLYMER FOILS WITH EUV (EXTREME-ULTRAVIOLET) RADIATION FOR APPLICATIONS IN BIOMEDICAL TECHNOLOGY

Project partners:

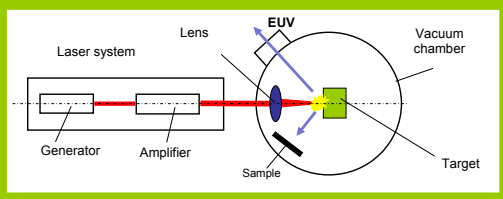
Institute of Applied Physics, Johannes-Kepler University Linz, Linz, Austria (Coordinator)
Institute of Optoelectronics, Military University of Technology, Warsaw, Poland
Rigaku Innovative Technology Europe, Prague, Czech Republic
Institute of Biophysics, Johannes Kepler University Linz, Linz, Austria

Scientific and Technological Project Goals:

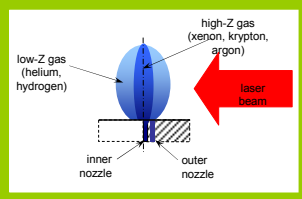
Novel methods and techniques of polymer surface modification for biomedical applications using extreme ultraviolet (EUV) radiation has been developed and a new compact laser plasma EUV source based on a gas puff target dedicated for this technique was built.

LASER PLASMA EUV SOURCE BASED ON A GAS PUFF TARGET

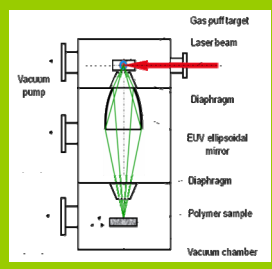
Laser plasma EUV source

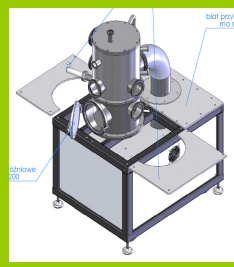


Double-stream gas puff target



Laser plasma EUV source for modification polymer surfaces

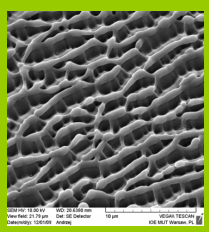




BIOCOMPATIBILITY STUDIES

Cultivation of CHO cells at EUV irradiated PET

SEM

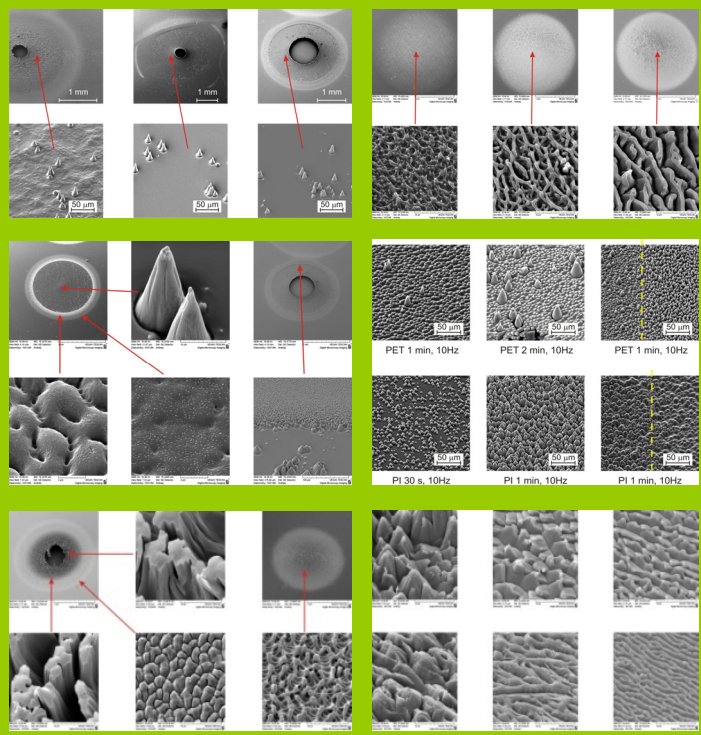


Phase Contrast Microscope

- good alignment of Chinese hamster ovary (CHO) cells along the direction of the walls,
- CHO cells showed only bad adhesion at the irradiated surfaces and no alignment for samples irradiated with UV laser at 193 nm,
- chemical surface modification is more pronounced for EUV irradiation.

MODIFICATION OF POLYMER SURFACES USING EXTREME ULTRAVIOLET (EUV)

Typical SEM images of EUV irradiated polymers



PUBLICATIONS

- A. Bartnik, H. Fiedorowicz, R. Jarocki, J. Kostecki, M. Szczurek, P.W. Wachulak, „Laser-plasma EUV source dedicated for surface processing of polymers" Nucl. Instr. Meth. Phys. Res. A 647 (2011) 125
- A. Bartnik, H. Fiedorowicz, R. Jarocki, J. Kostecki, M. Szczurek, O. Chernyayeva, J.W. Sobczak, „EUV-induced physico-chemical changes in near-surface layers of polymers" J. Electron Spectrosc. Relat. Phenom. 184 (2011) 270
- A. Bartnik, H. Fiedorowicz, S. Burdyńska, R. Jarocki, J. Kostecki, M. Szczurek, „Combined effect of EUV irradiation and acetone treatment on PET surface", Appl. Phys. A 103 (2011) 173
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- A. Bartnik, H. Fiedorowicz, R.Jarocki, J. Kostecki, R. Rakowski, A. Szczurek, M. Szczurek, „Micro- and Nanoprocessing of Polymers Using a Laser Plasma Extreme Ultraviolet Source", Acta Physica Polonica A, 117 (2010) 384
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- A. Bartnik, H. Fiedorowicz, R. Jarocki, J. Kostecki, A. Szczurek, M. Szczurek, „Creation of nanostructures on polymer surfaces irradiated with extreme ultraviolet pulsem" Acta Phys. Pol. A 116 (2009) S108