

(i) **degradace povrchu vysokoenergetickými svazky**
(ionty, elektrony, laser, plasma)

Mikrotron

FJFI ČVUT

electron
beam
(10 MeV)

Cyklotron

GSI, Darmstadt

ion
beam
(GeV)

Implantátor

Fraunhofer Inst., Erlangen, FEL ČVUT

ion
beam
(200 keV)

Lineární urychlovač

GSI, Darmstadt; NI Dubna

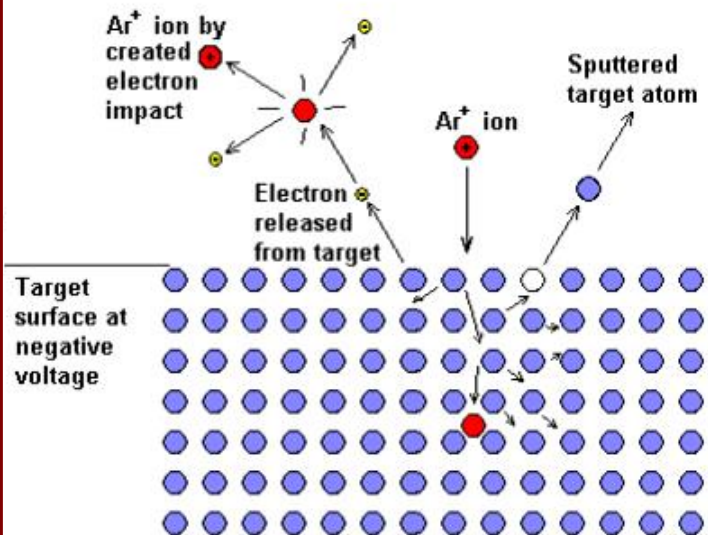
ion
beam
(GeV)

A



Plasma, VŠCHT Praha

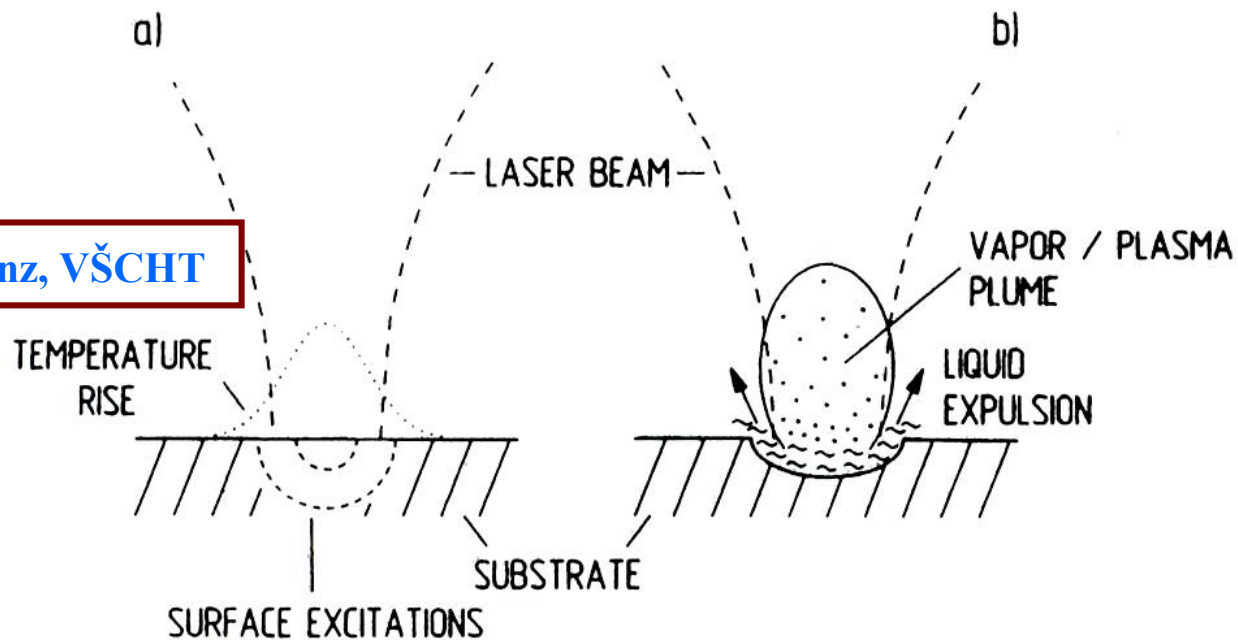
B



a)

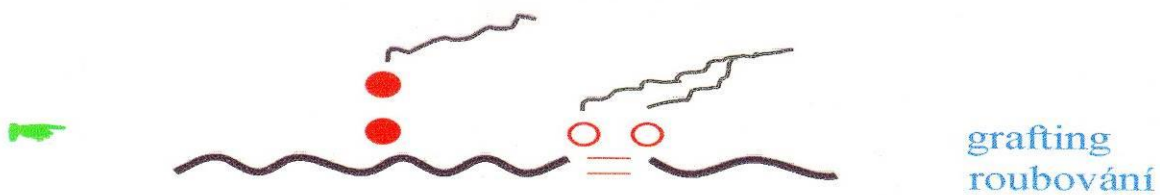
b)

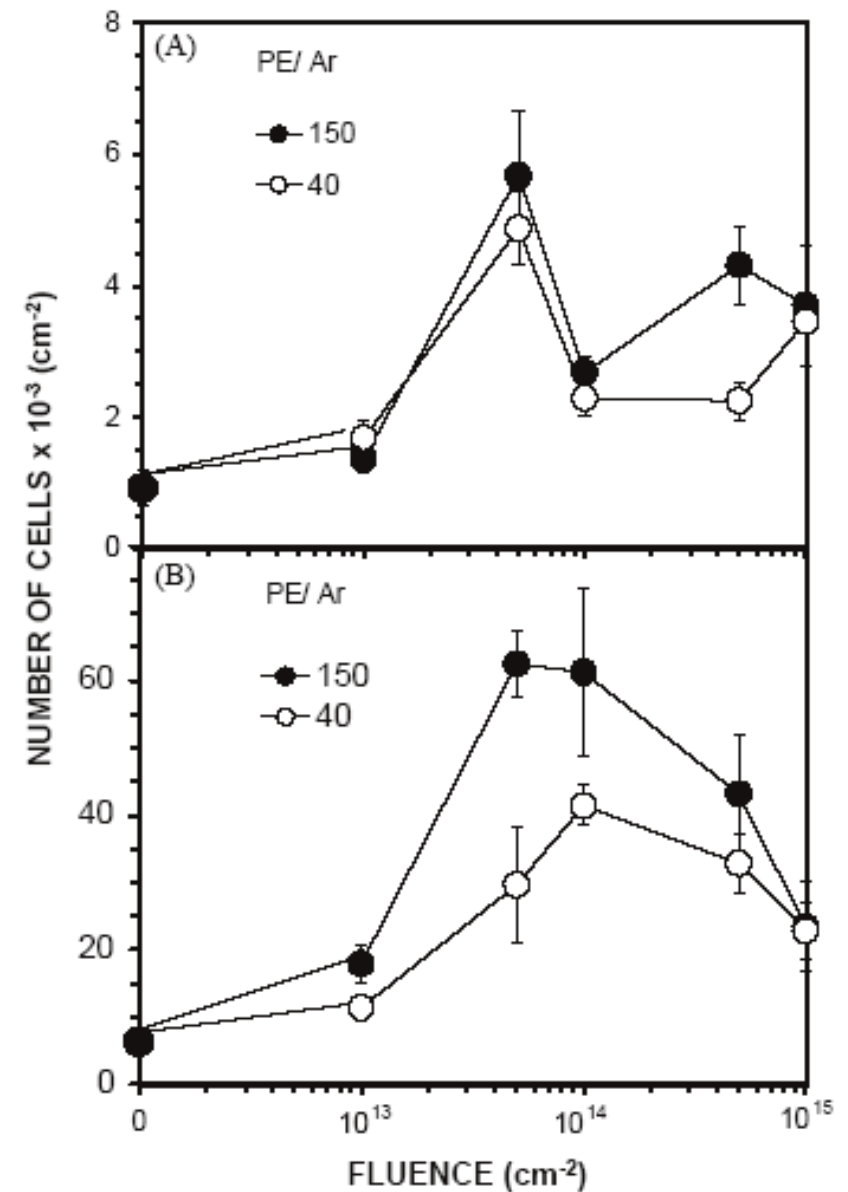
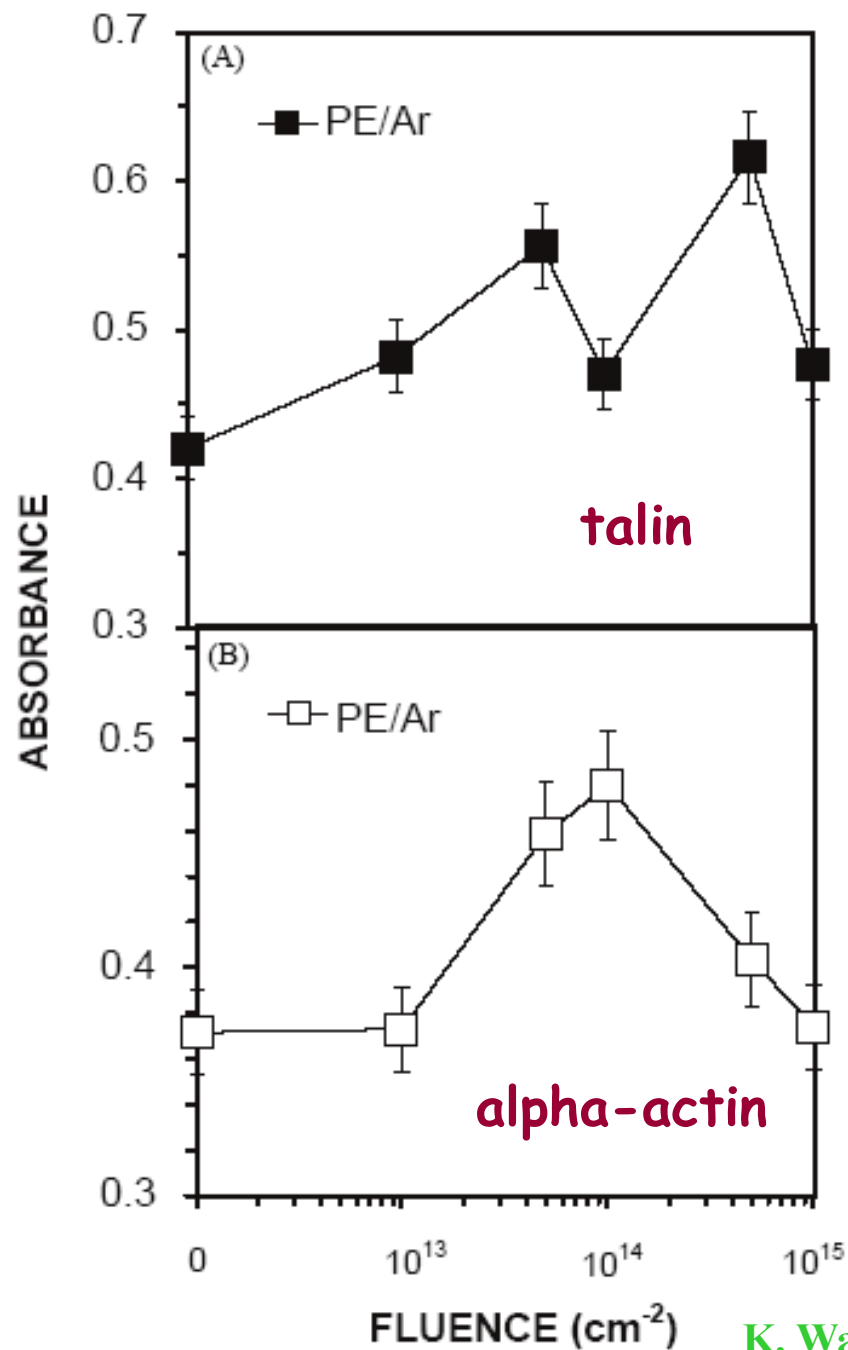
Laser, JKU Linz, VŠCHT





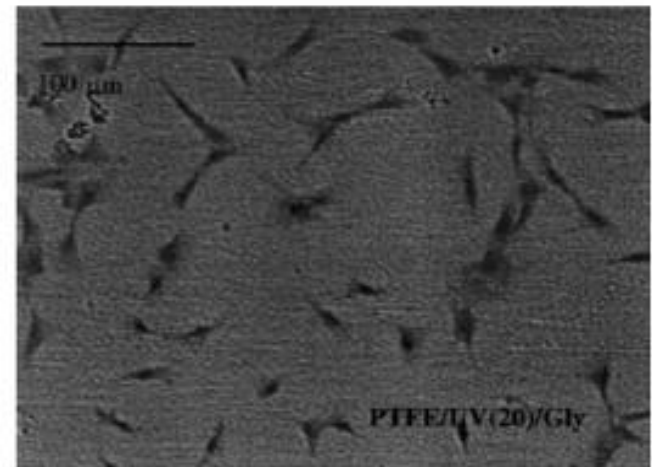
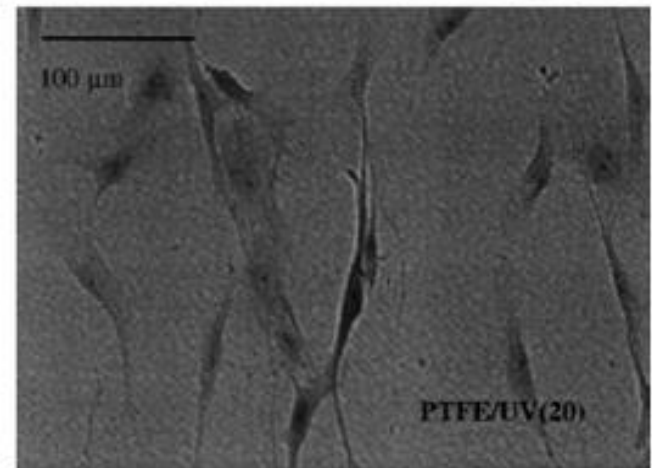
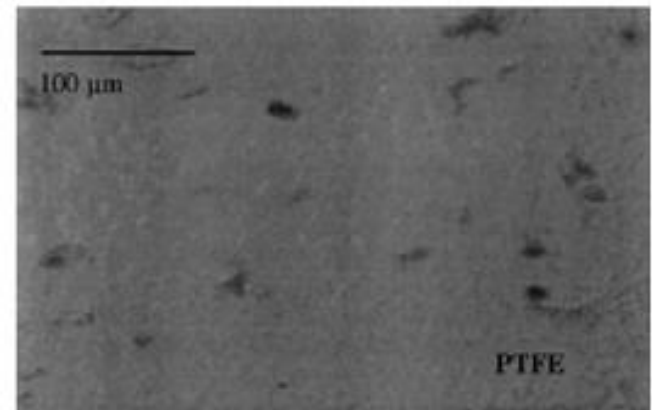
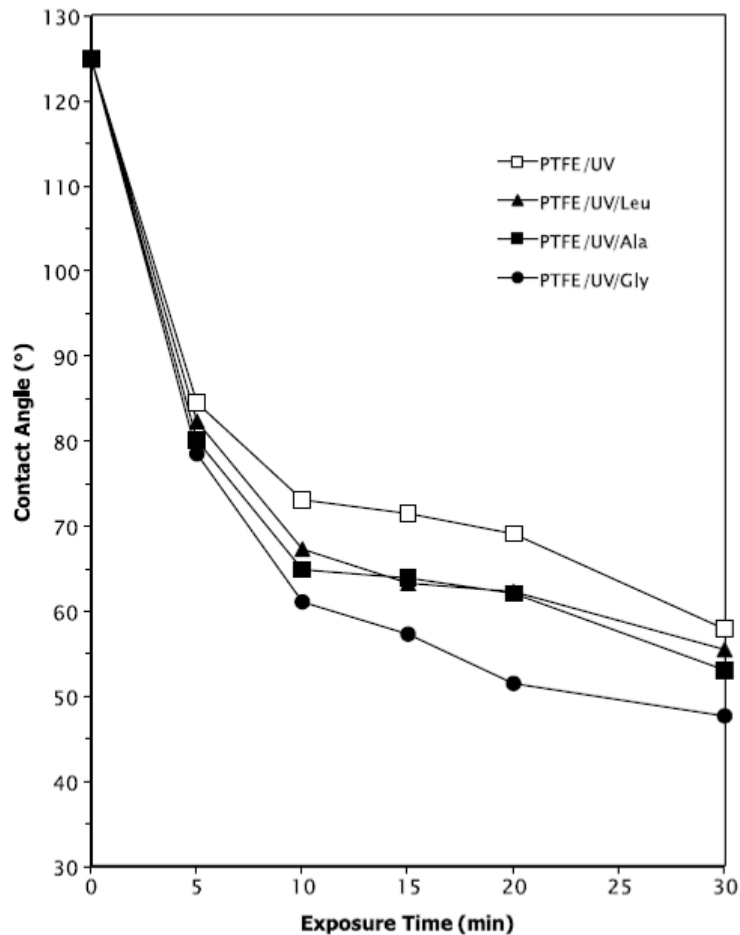
MODIFIKACE (iont. implantace, UV, plazma)





Cell proliferation on UV-excimer lamp modified and grafted polytetrafluoroethylene

V.Svorcik, K.Rockova, E.Ratajova, J.Heitz, N.Huber, D.
Bauerle, L.Bacakova, B. Dvorankova, V. Hnatowicz
Nucl. Instrum. Meth. B 217 (2004) 307-313



Bio-compatibility of ion beam-modified and RGD-grafted polyethylene

K.Rockova-Hlavackova, V.Svorcik, L.Bacakova, B.Dvorankova,
J.Heitz, V.Hnatowicz

Nucl. Instrum. Meth. B 225 (2004) 275-282

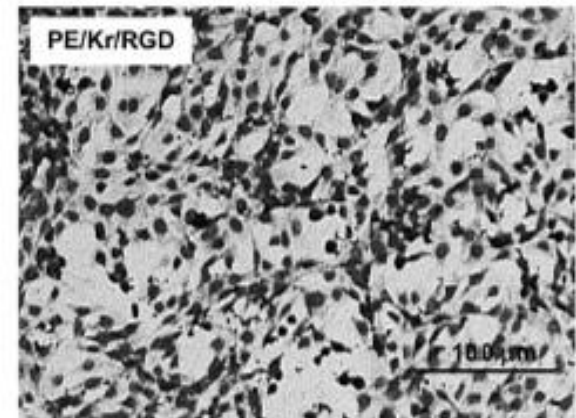
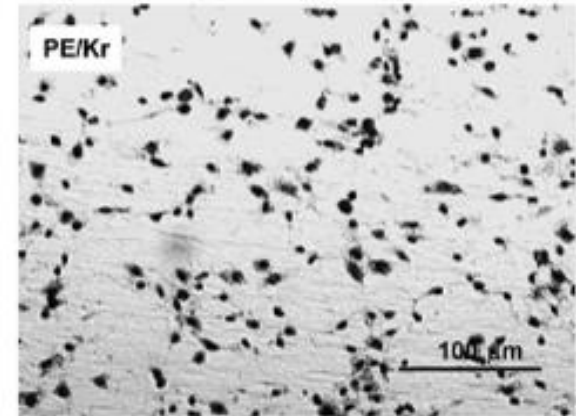
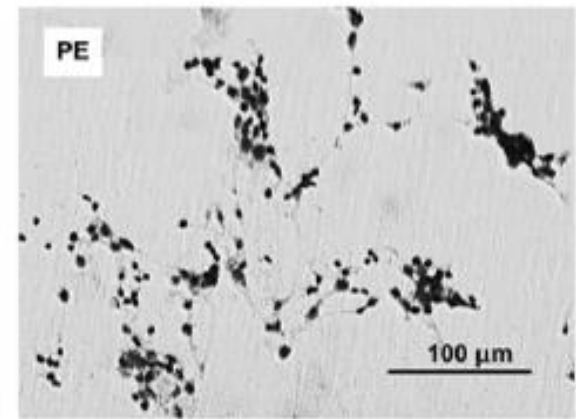
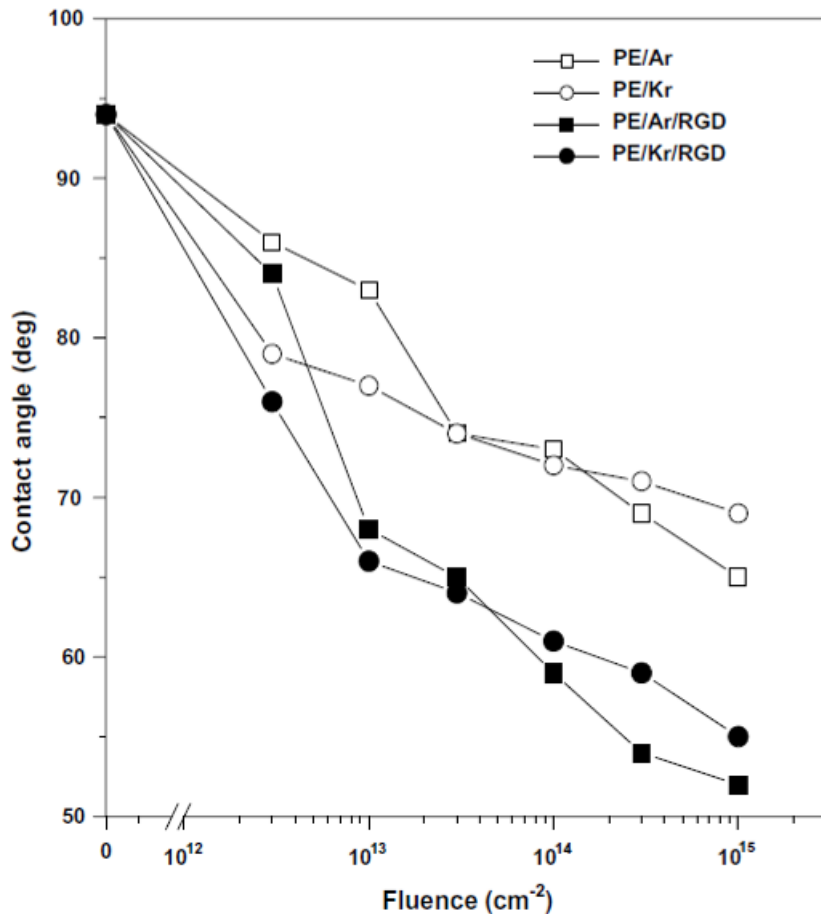
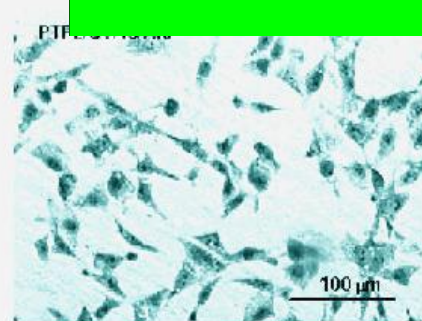
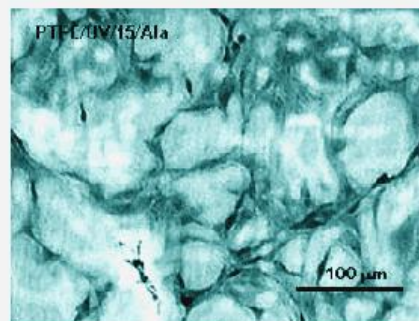
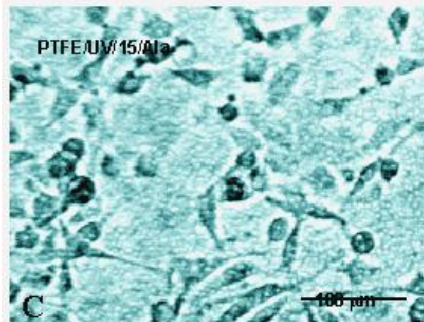
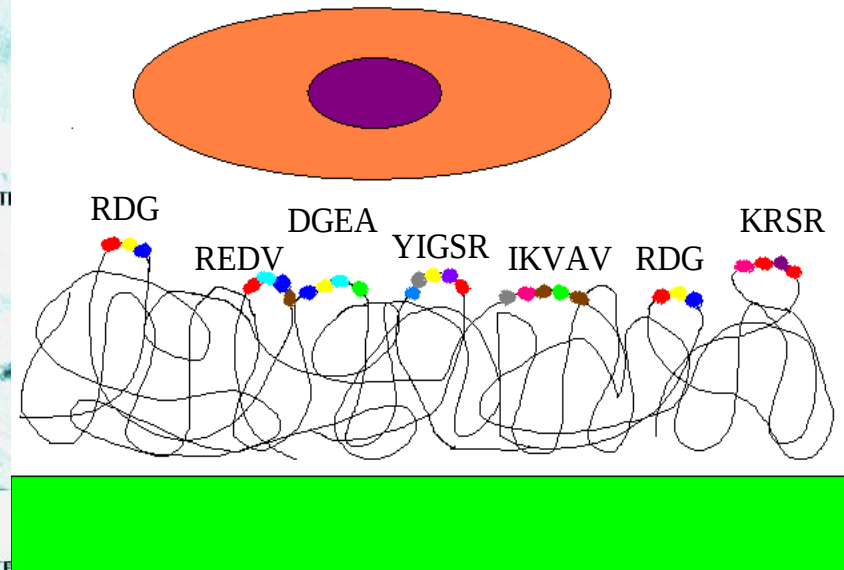
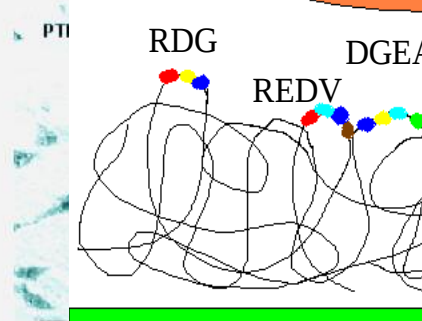
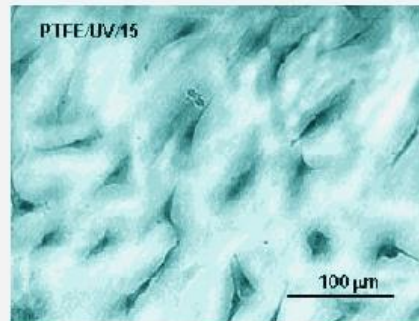
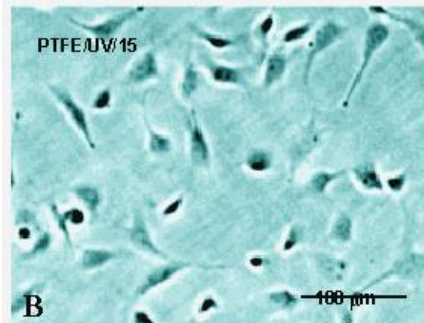
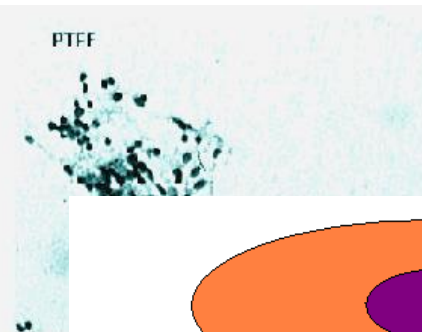
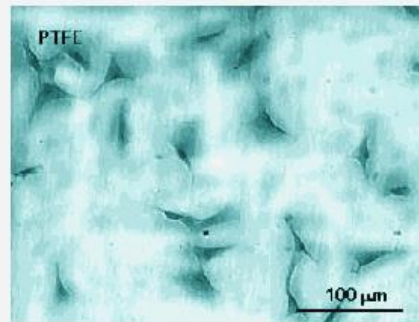
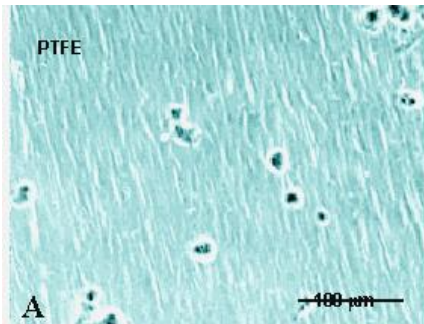


Fig. 5. The microphotographs of adhering cells (after 6 h) on pristine PE, PE implanted with Kr⁺ ions to the fluence of 3 × 10¹³ cm⁻² and PE implanted to the same fluence and subsequently grafted with RGD sequence.

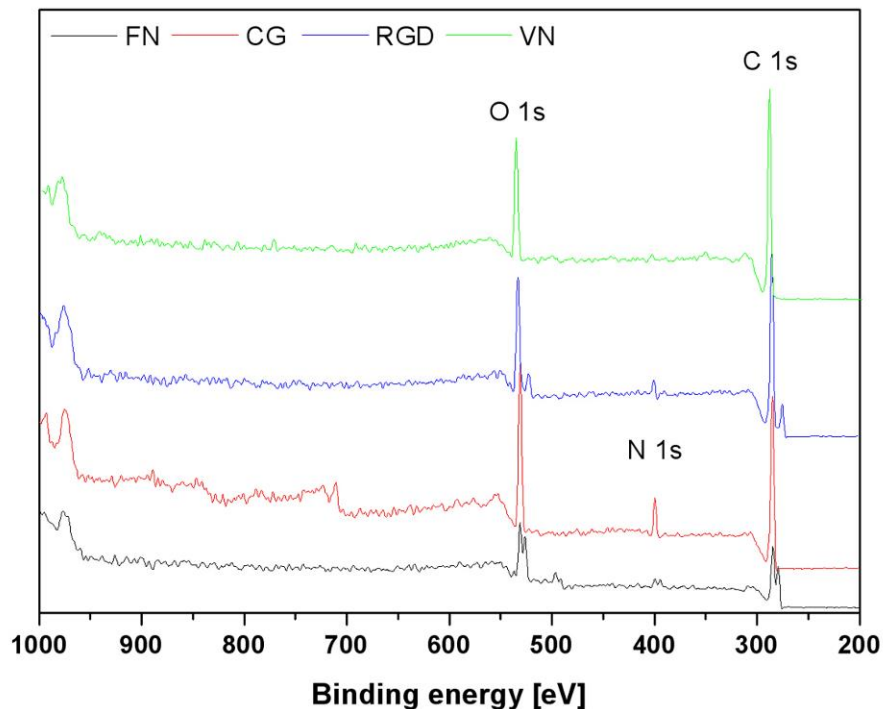
HEC

SMC

3T3



J.Heitz, V.Švorčík, et al., J.Biomed.Mater.Res. 67A, 130 (2003).
 T.Gumpenberger, V.Švorčík, et al., Biomaterials 24, 5139 (2003).



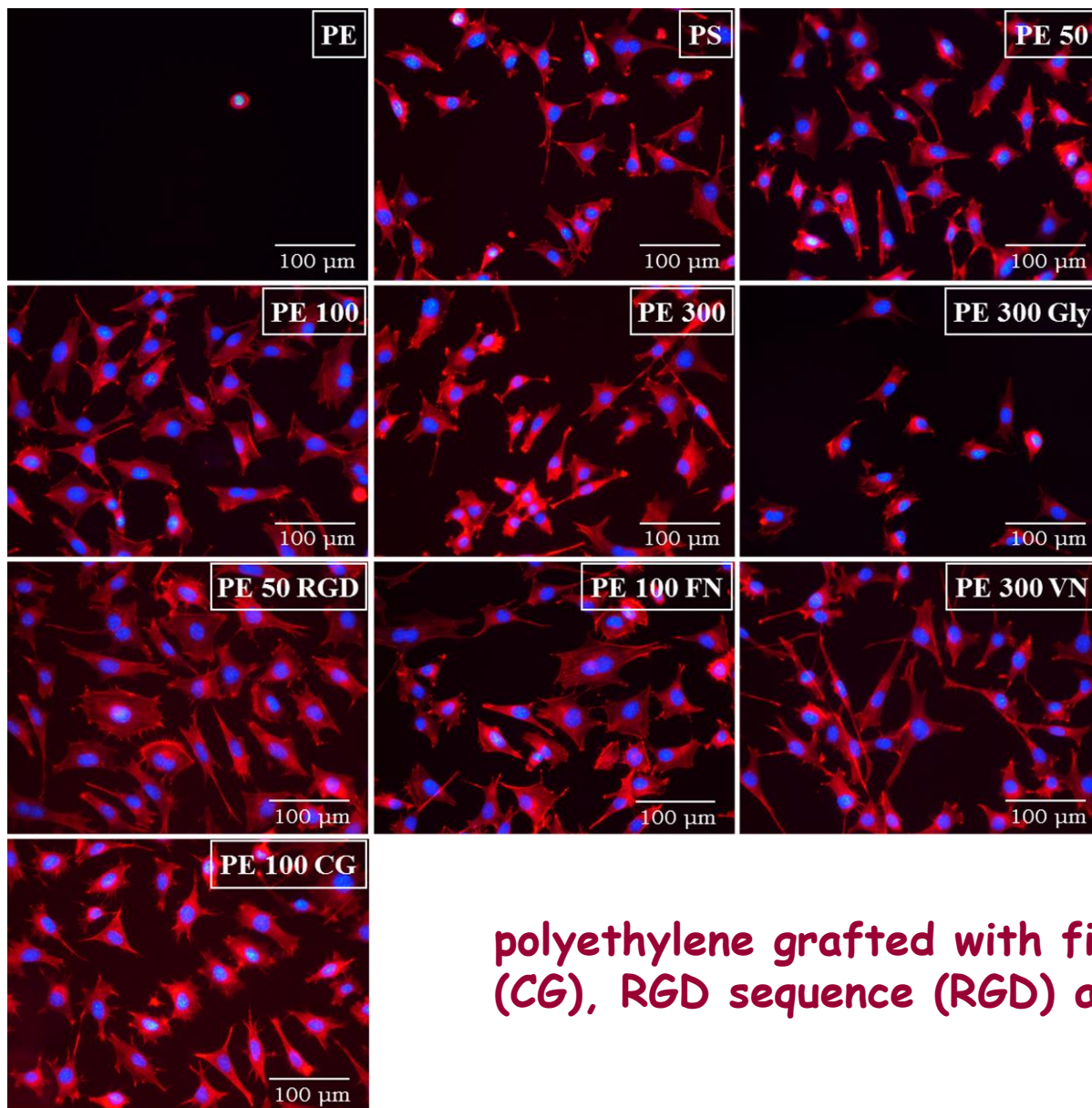
polyethylene grafted with
fibronectin (FN), collagen (CG), RGD
sequence (RGD) and vitronectin (VN)

ET
[s]

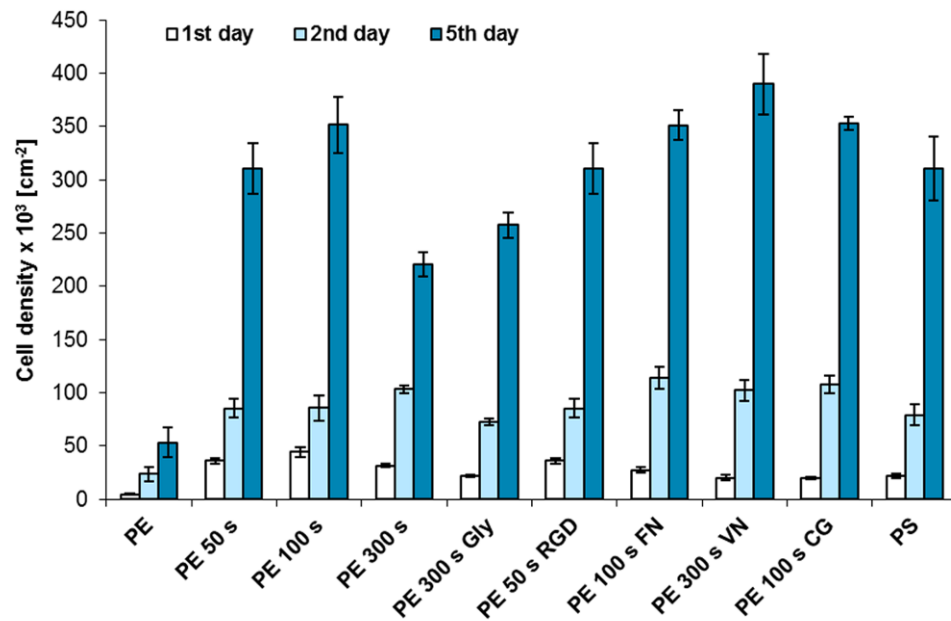
Surface roughness (R_a)[nm]

	PE	PE Gly	PE RGD	PE FN	PE VN	PE CG	PS
0	10.4	-	-	-	-	-	0.5
50	10.1	9.5	9.3	10.4	11.2	12.1	-
100	12.0	9.6	8.8	11.7	12.9	9.9	-
300	11.2	6.1	9.4	12.0	5.4	11.3	-

S.Rimpelová, N.Slepičková
Kasálková, P.Slepička,
H.Lemerová, V.Švorčík,
T.Ruml, Mater. Sci. Eng. C,
33, 1116-1124 (2013)

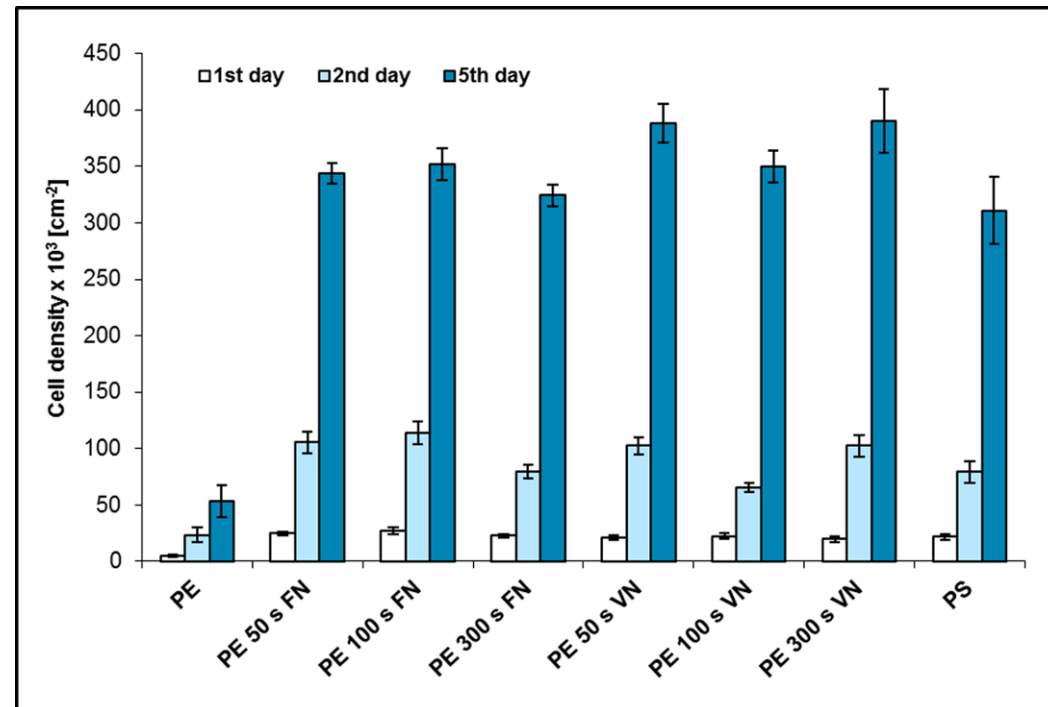


polyethylene grafted with fibronectin (FN), collagen (CG), RGD sequence (RGD) and vitronectin (VN)

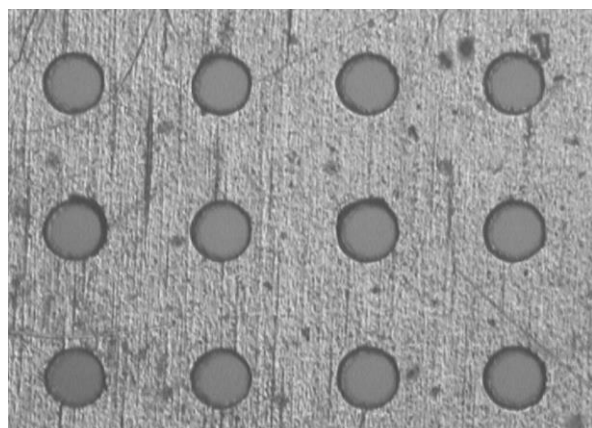


polyethylene grafted with fibronectin (FN), collagen (CG), RGD sequence (RGD) and vitronectin (VN)

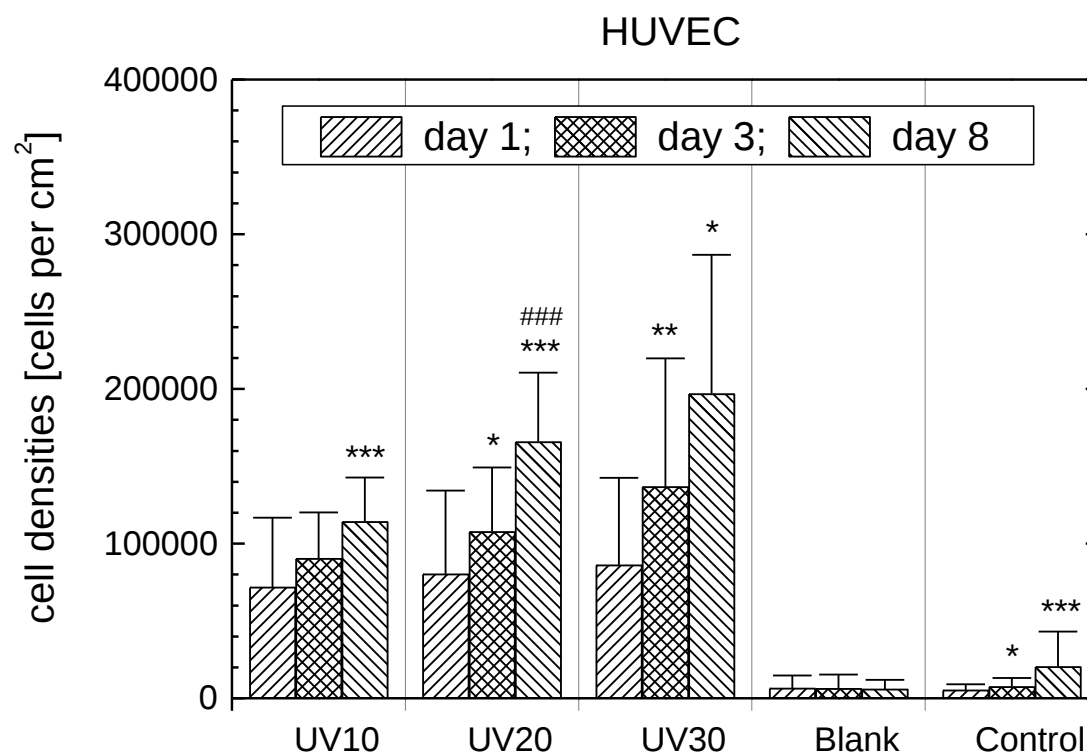
S.Rimpelová, N.Slepičková Kasálková, P.Slepička, H.Lemerová, V.Švorčík, T.Ruml, Mater. Sci. Eng. C, 33, 1116-1124 (2013)



PTFE modified by 172 nm Xe_2^* -lamp radiation in NH_3

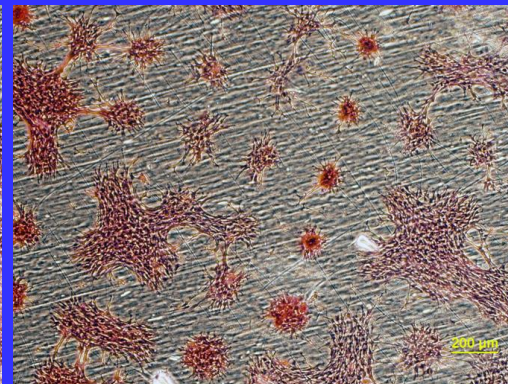
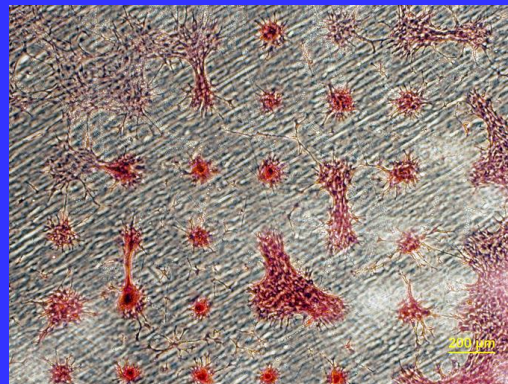
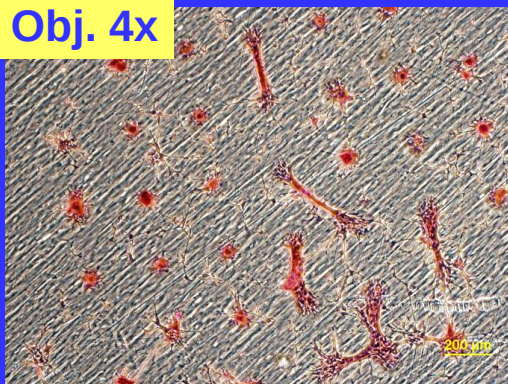


500 μm

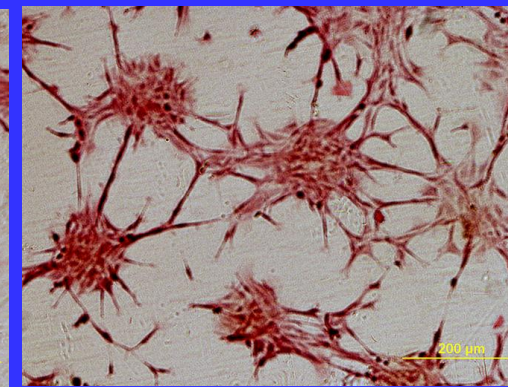
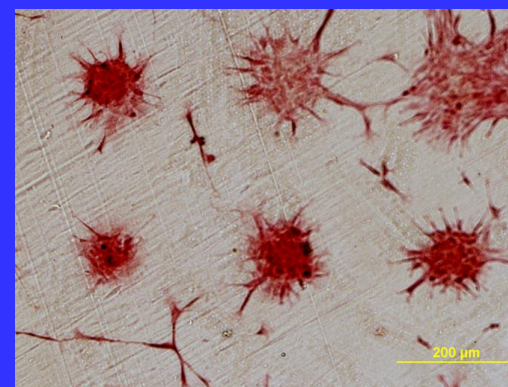
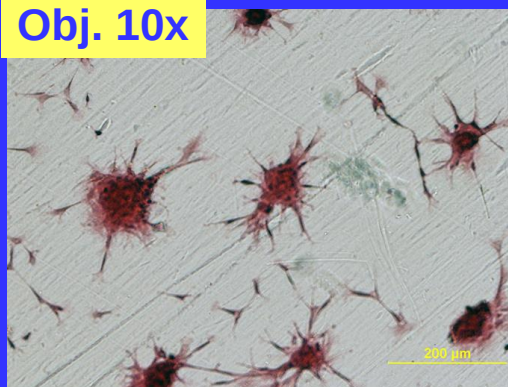


Morfologie buněk na PET modifikovaném UV zářením v NH_3 atmosféře – 3. den po nasazení

Obj. 4x



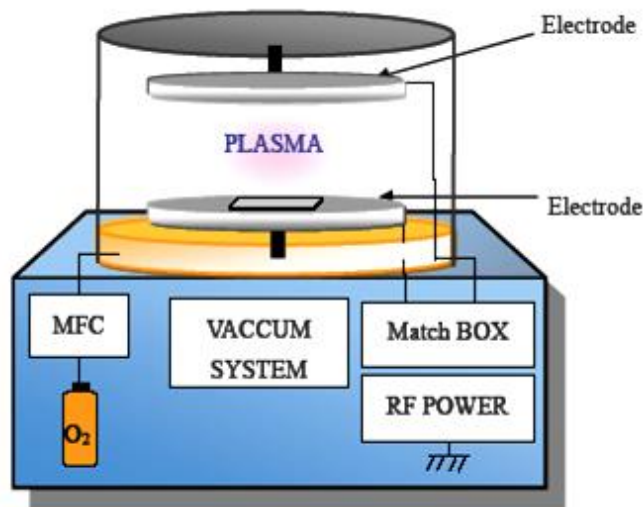
Obj. 10x



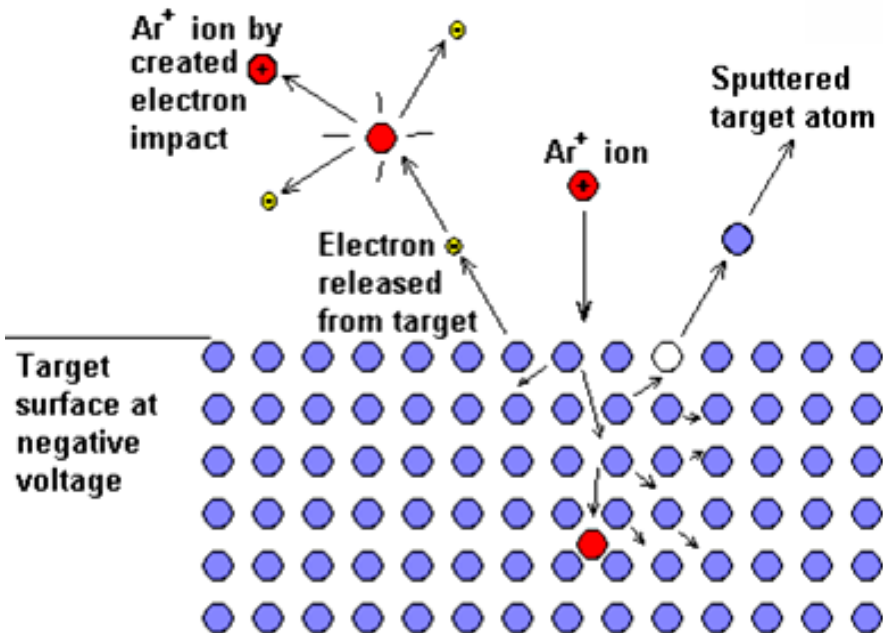
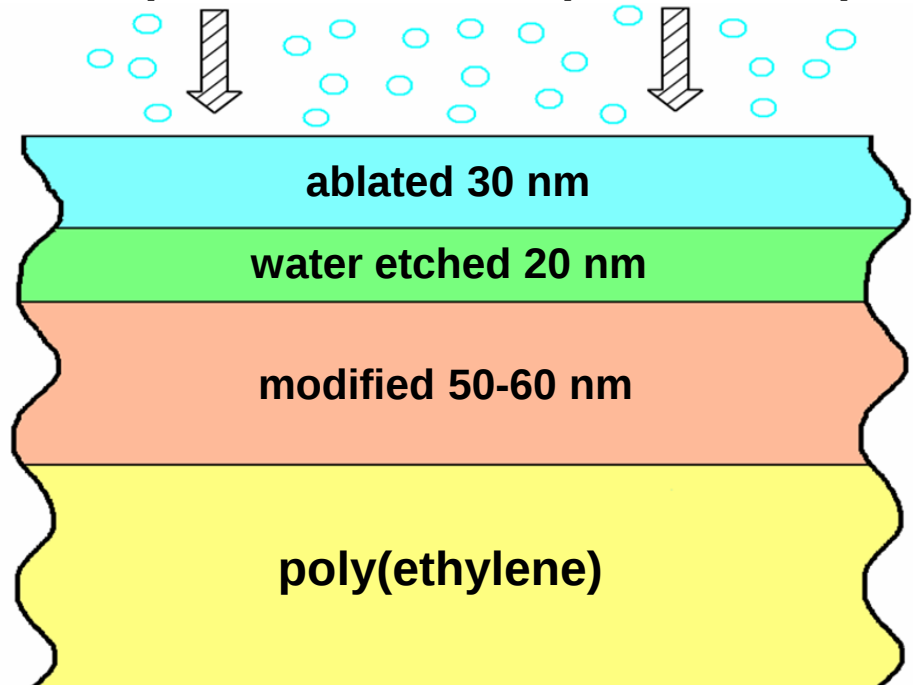
10 min

20 min

30 min

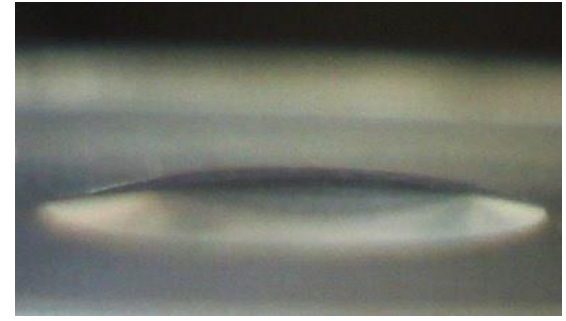
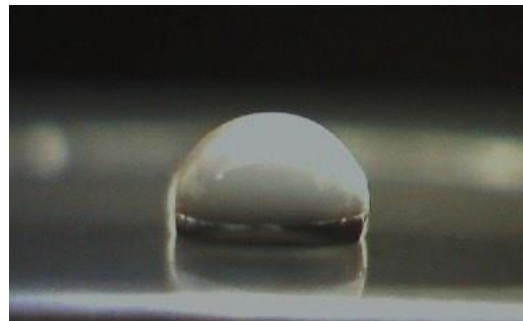
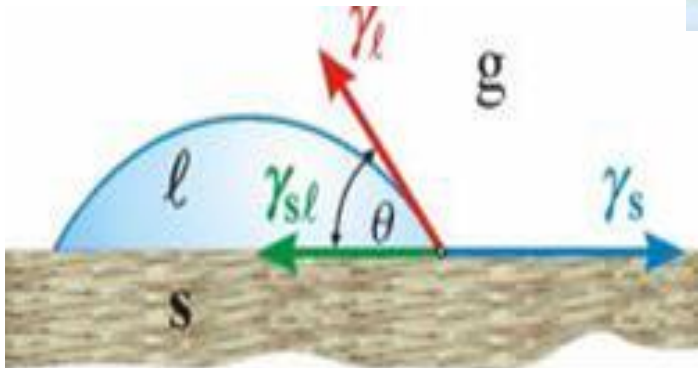
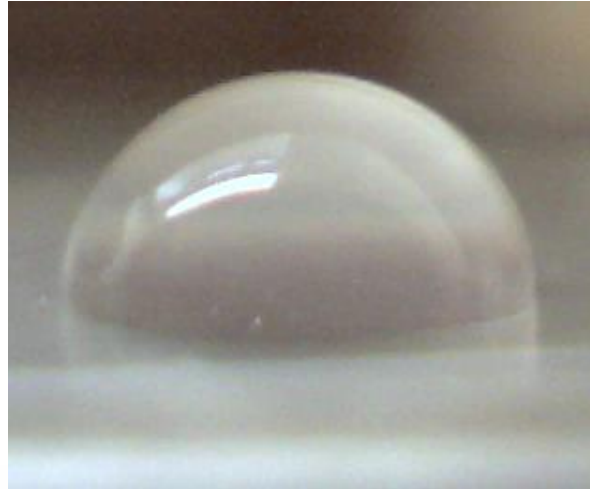
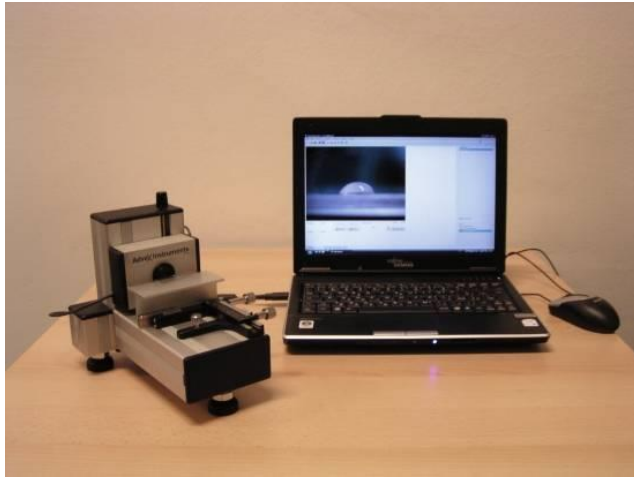


Ar plasma treatment (8.3 W, 240 s)

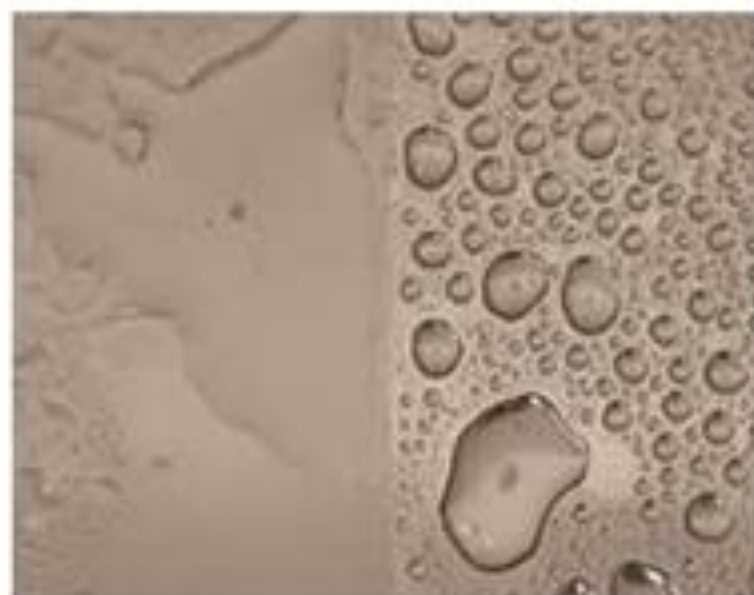


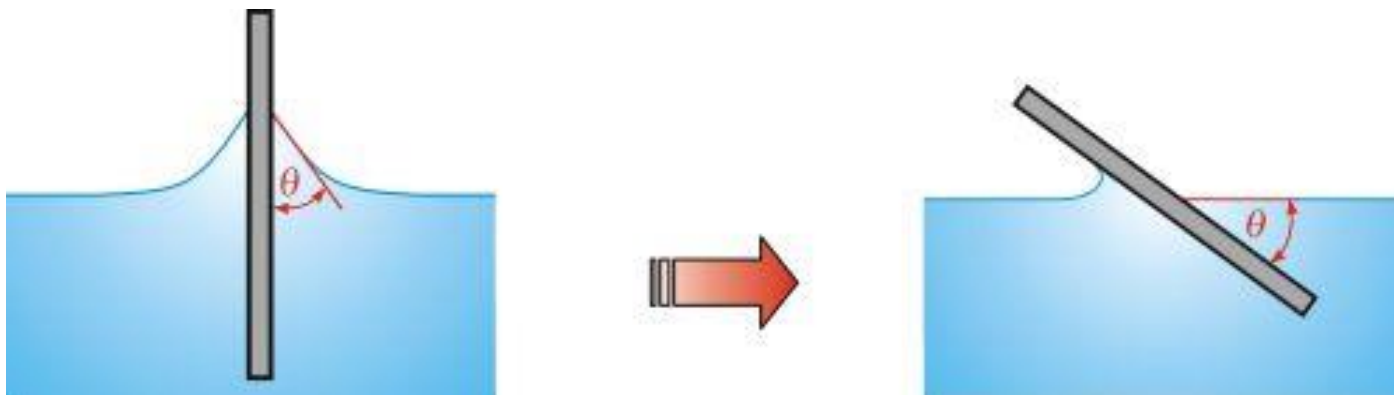
V.Švorčík et al., Polym. Degr. Stab. 92, 1645 (2007).

Měření smáčivosti povrchu



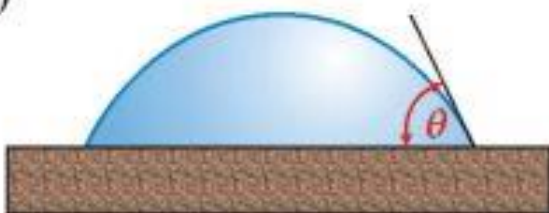
Smáčivost, povrchová polarita



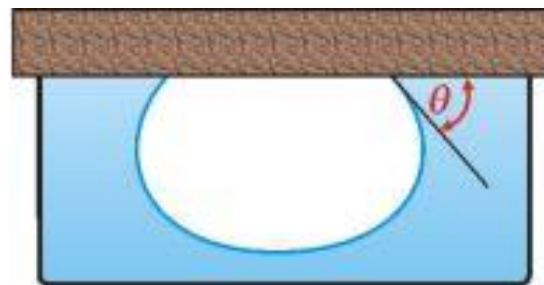


Měření úhlu smáčení na nakloněné desce

(a)

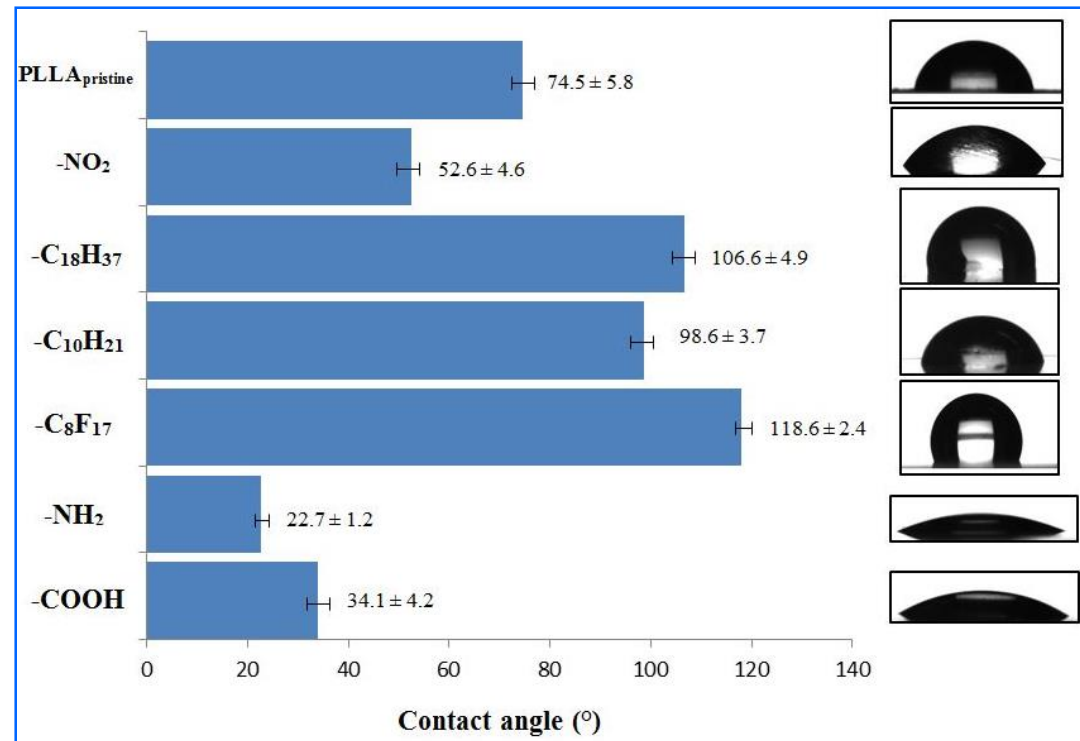
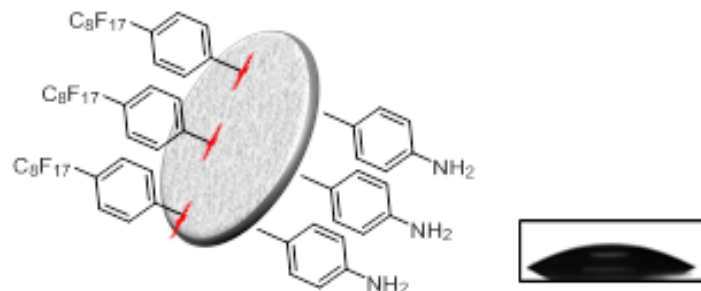
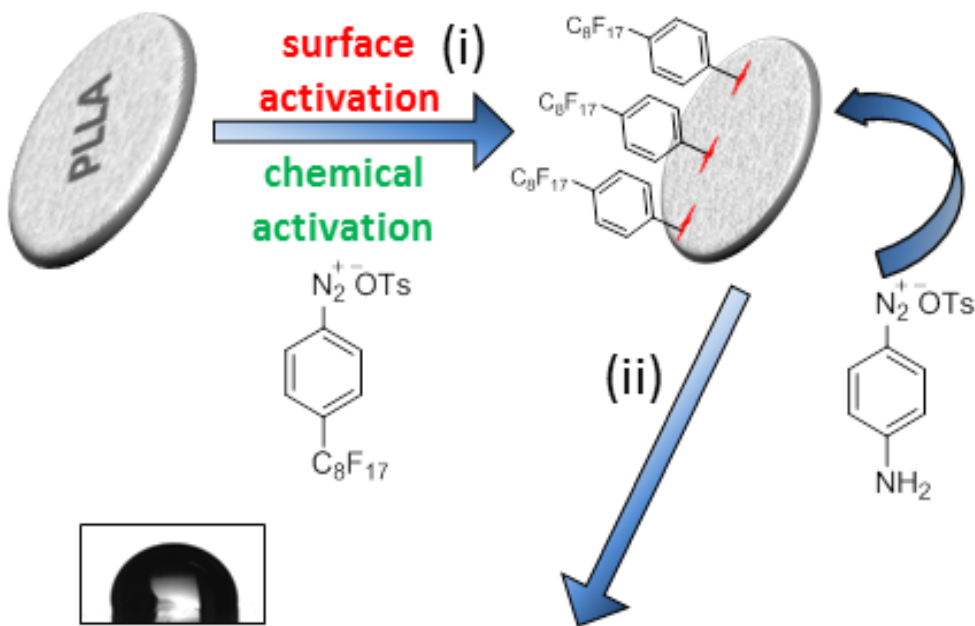


(b)

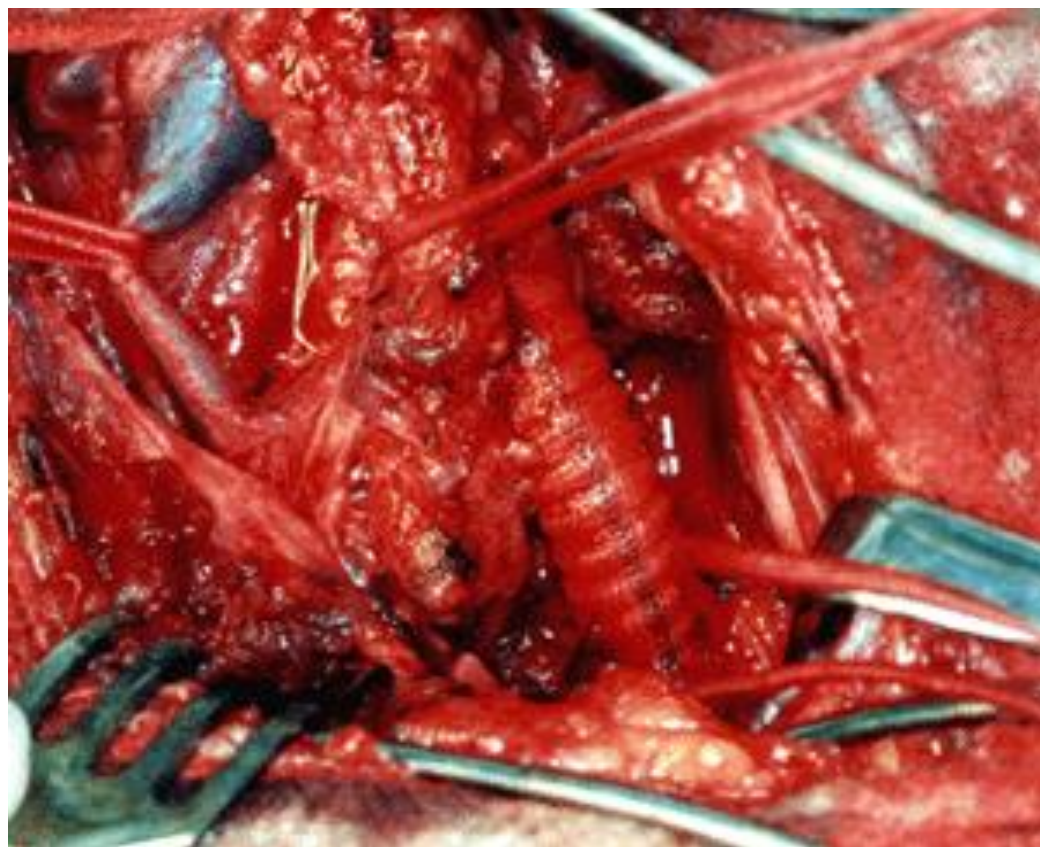
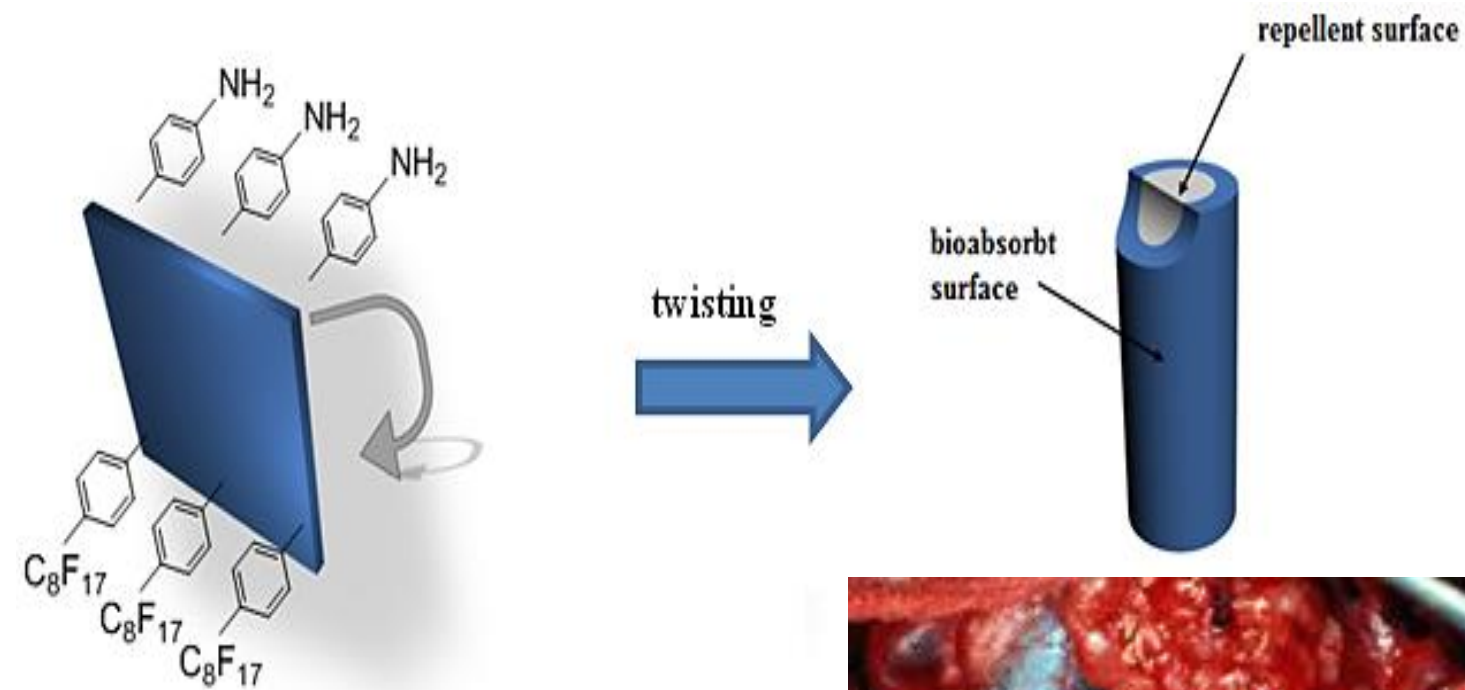


Přisedlá kapka (a) a přilínající bublina (b)

Aktivní nádrady cév

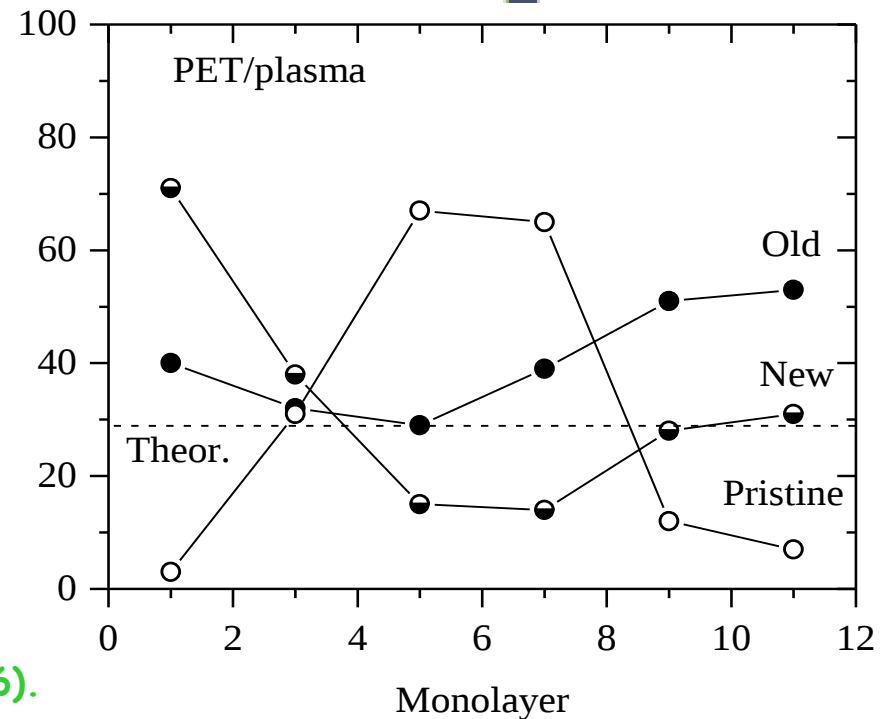
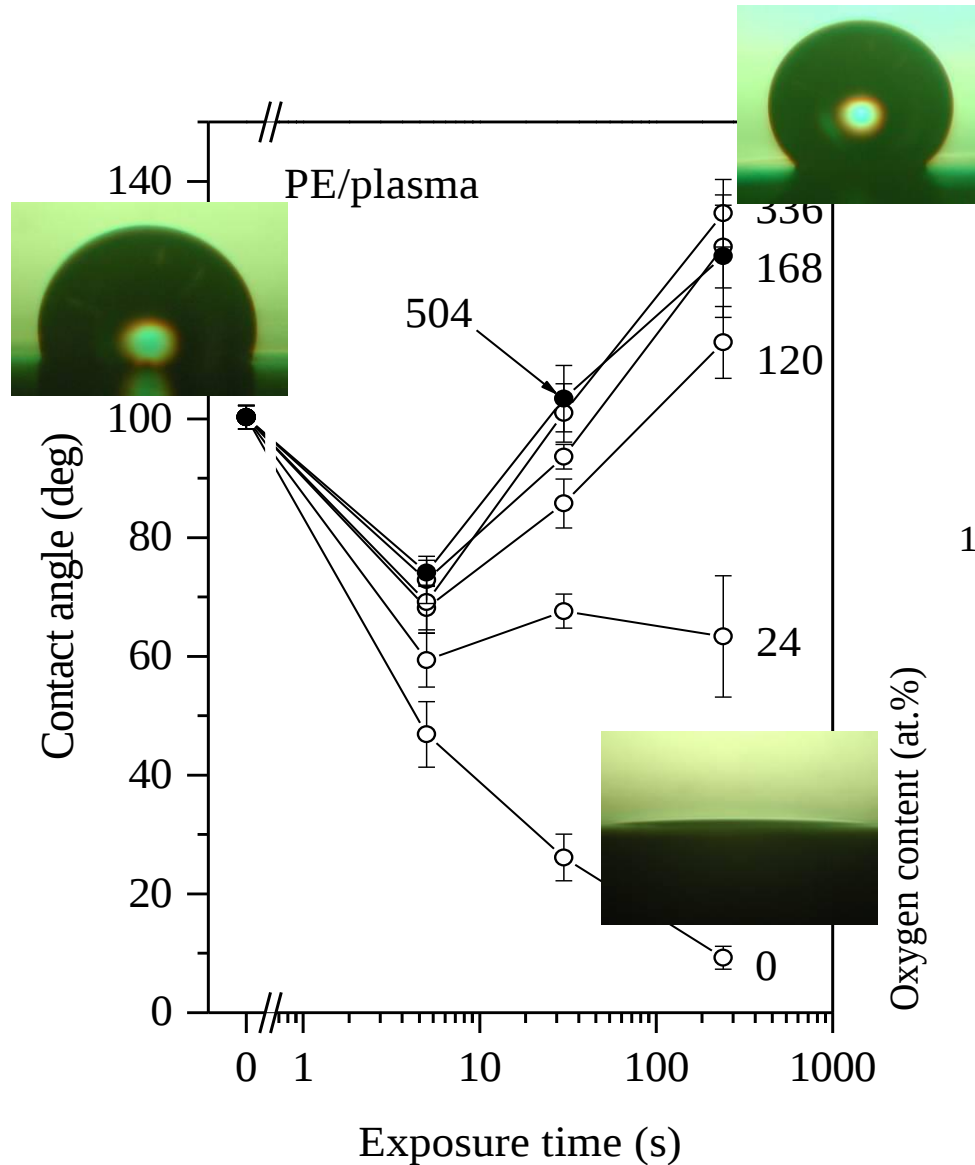


K.Bastekova, O.Guselnikova, P.Postnikov, R.Elashnikov, M.Kunes, Z.Kolska, V.Švorčík, O.Lyutakov, Appl. Surf. Sci. 397, 226-234 (2017).

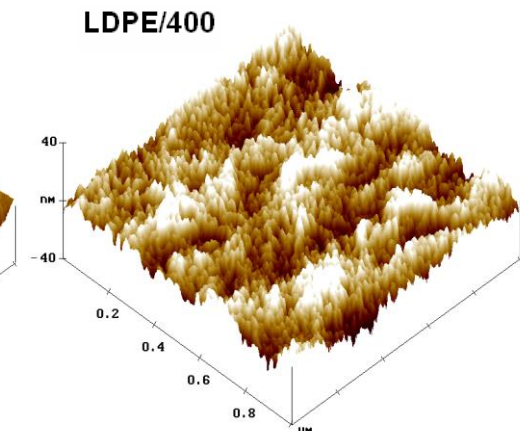
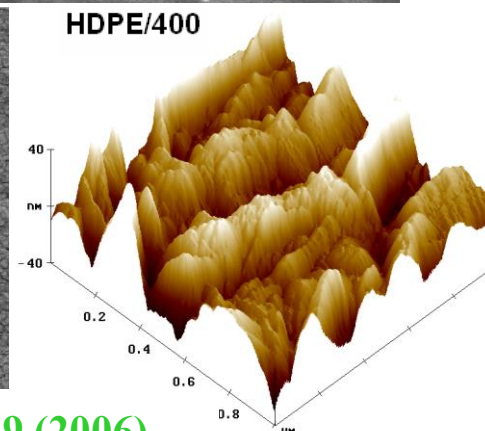
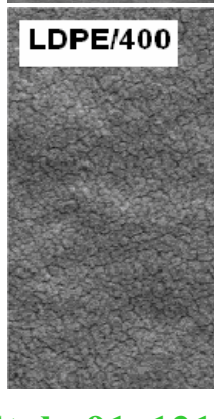
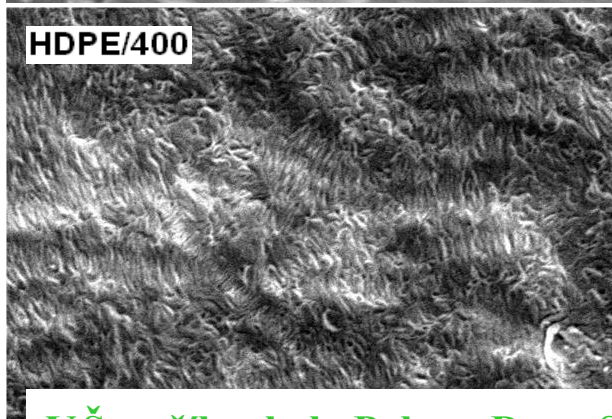
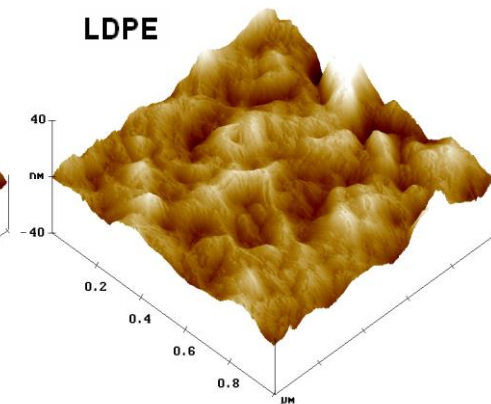
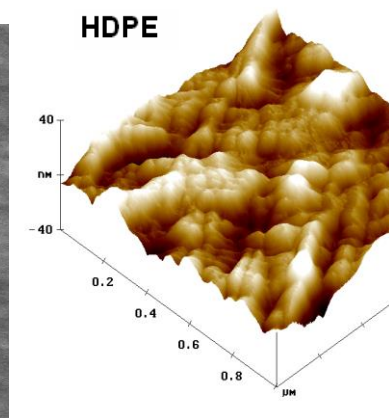
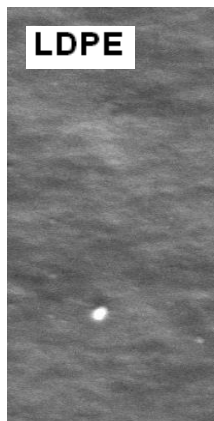
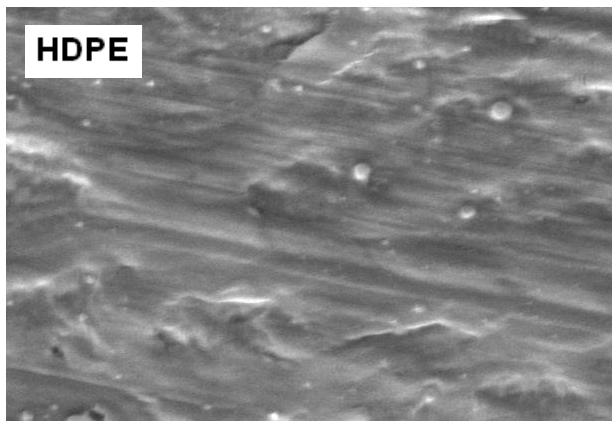
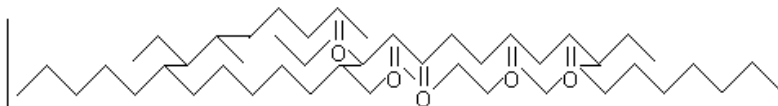


K.Bastekova, O.Guselnikova, P.Postnikov,
R.Elashnikov, M.Kunes, Z.Kolska,
V.Švorčík, O.Lyutakov, Appl. Surf. Sci.
397, 226-234 (2017).

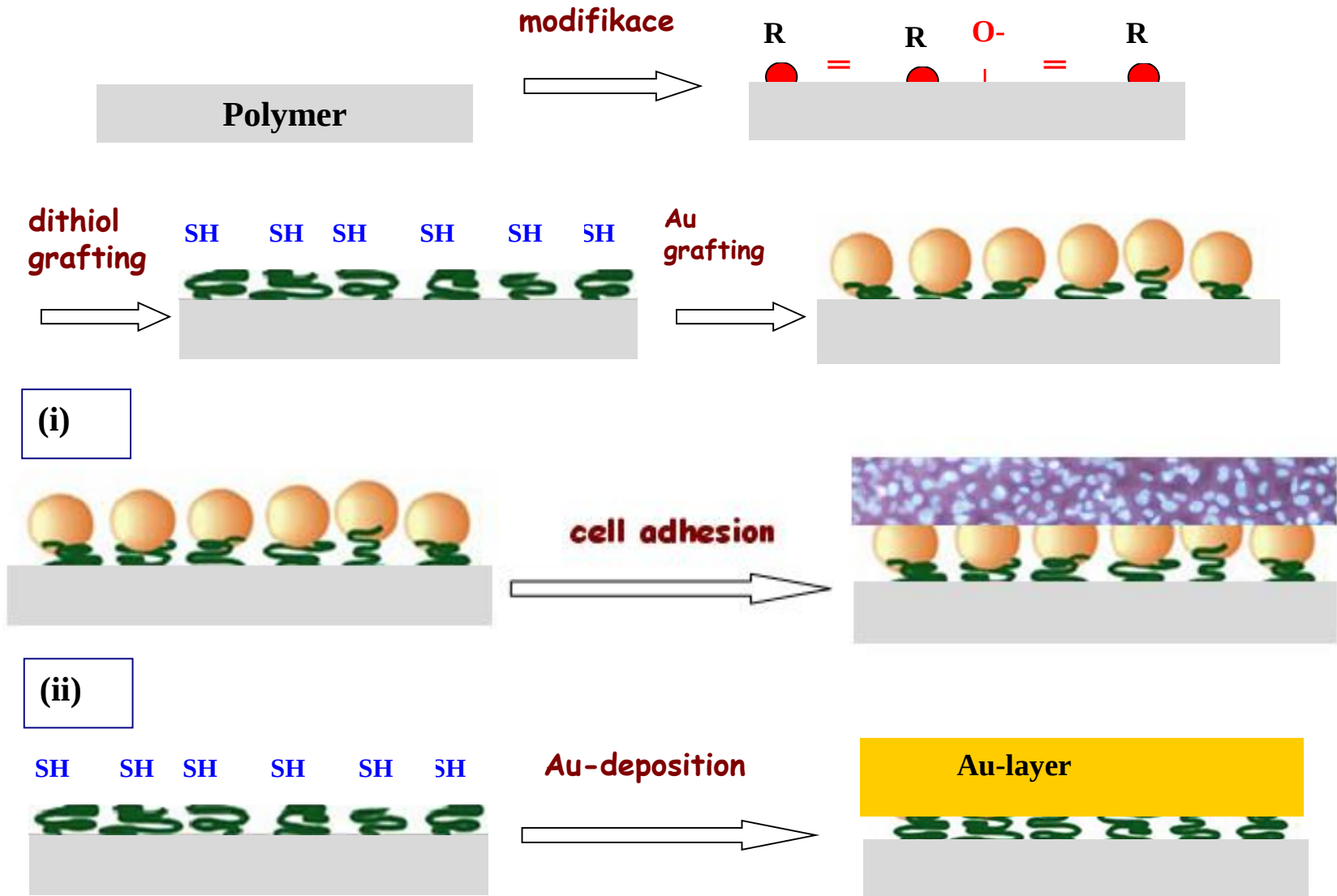
modifikace polymerů v plasmě

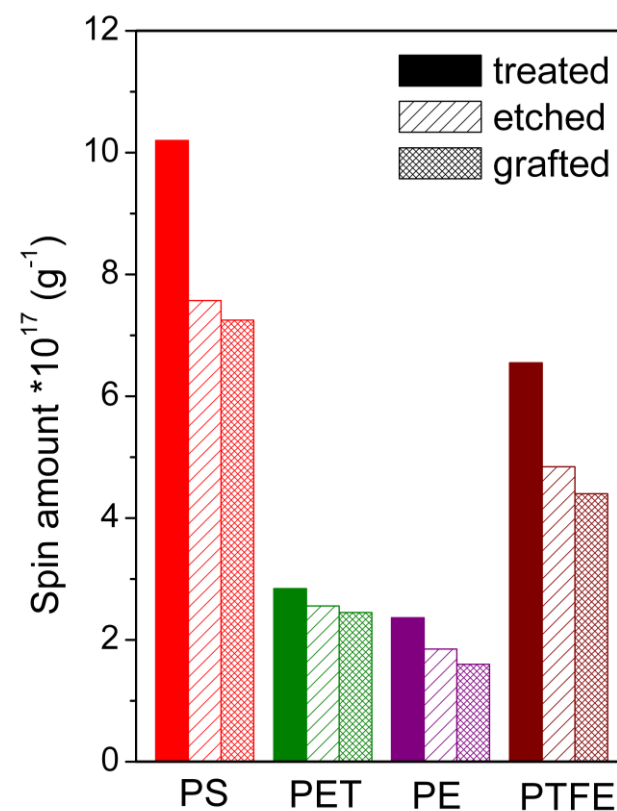
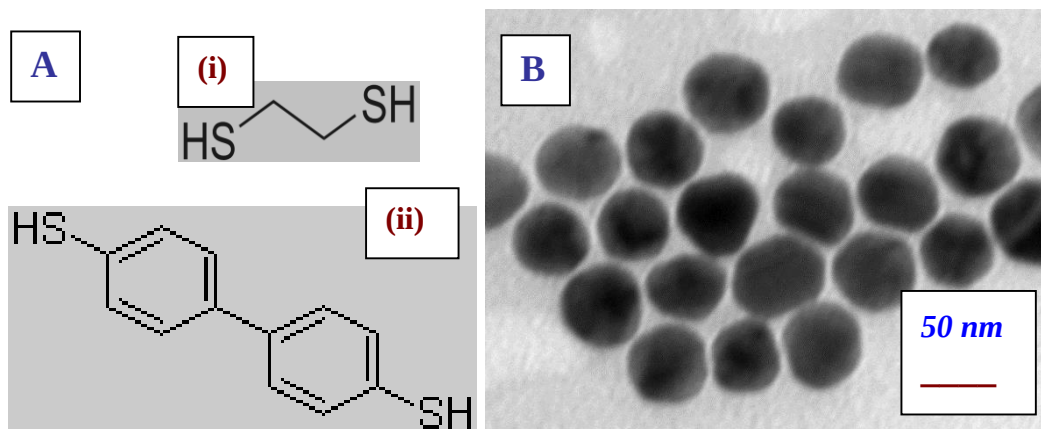


Povrchová morfologie

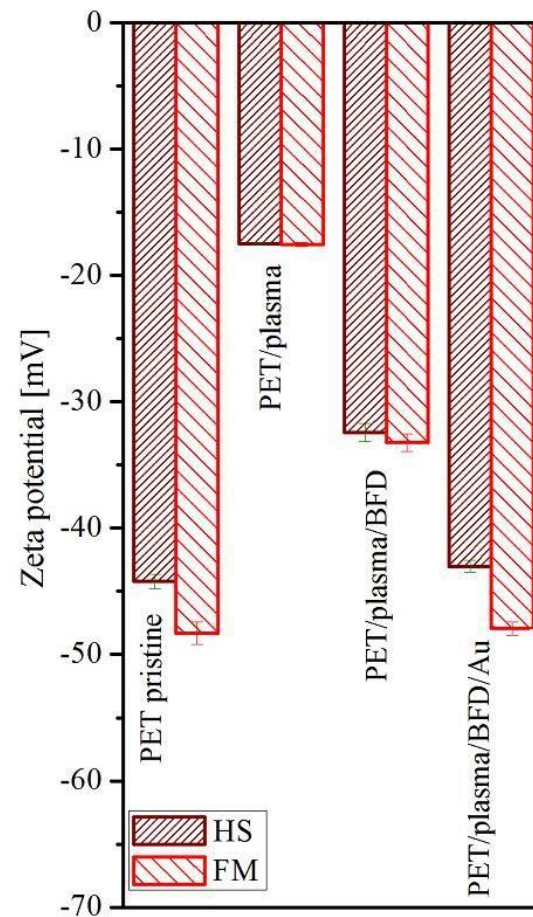
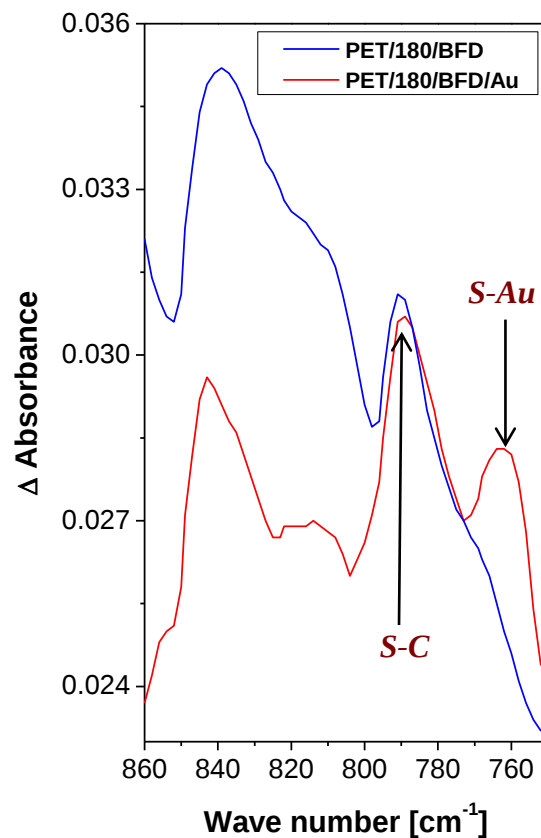
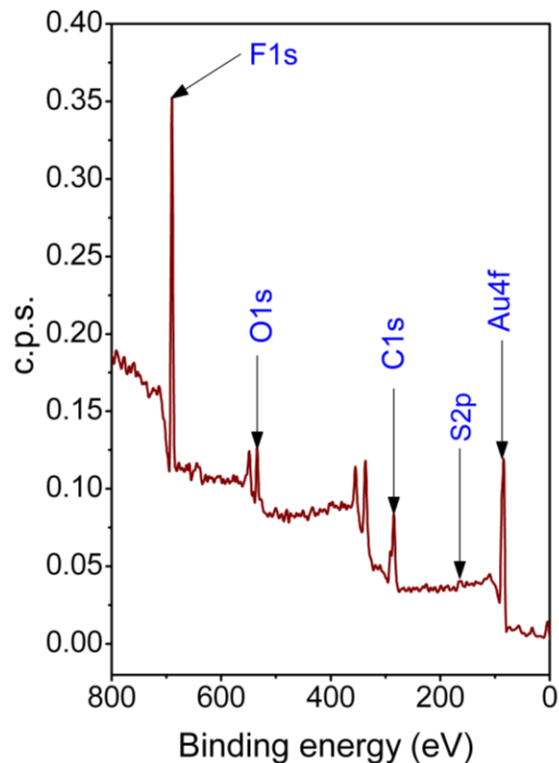


Au nanočástice na modifikovaném polymeru

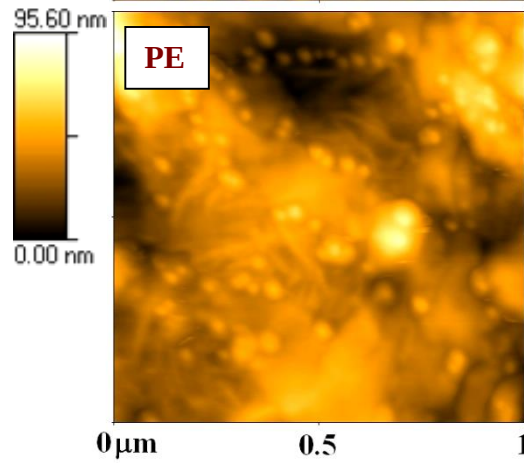
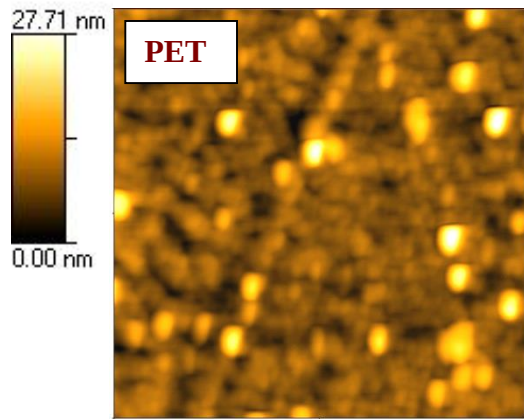




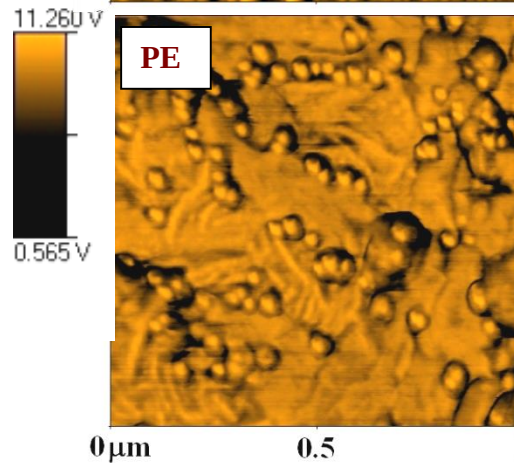
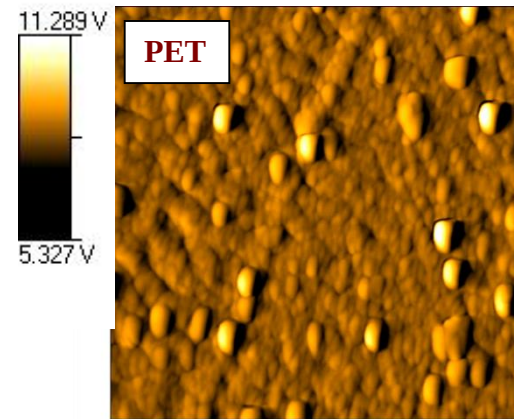
V.Švorčík, A.Řezníčková, P.Sajdl, Z.Kolská, Z.Makajová,
P.Slepička, J. Mater. Sci. 46, 7917 (2011)



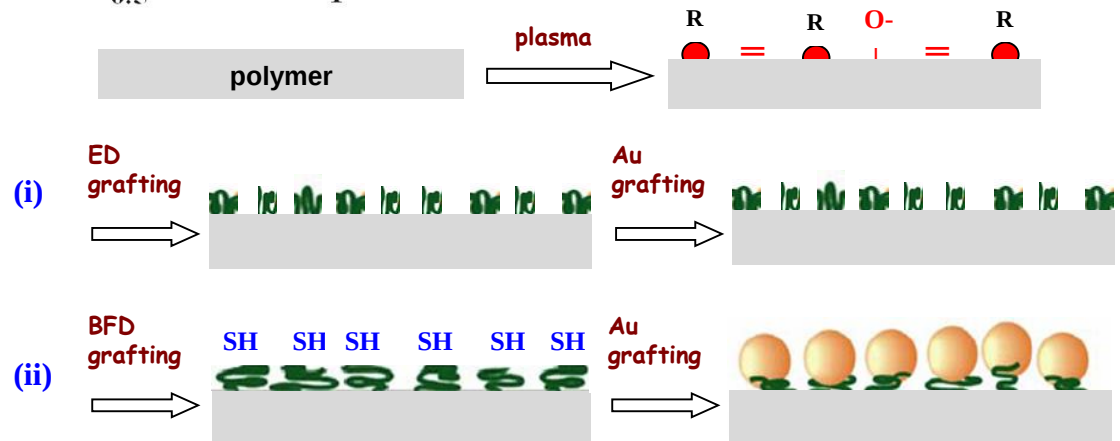
A



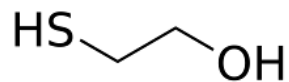
B



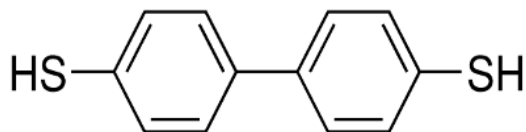
V. Švorčík, Z. Kolská, O. Kvítek,
J. Siegel, A. Řezníčková,
P. Řezanka, K. Záruba, *Nanoscale Res. Lett* 6, 607 (2011).



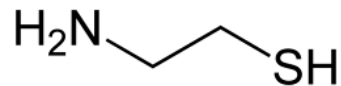
A



B

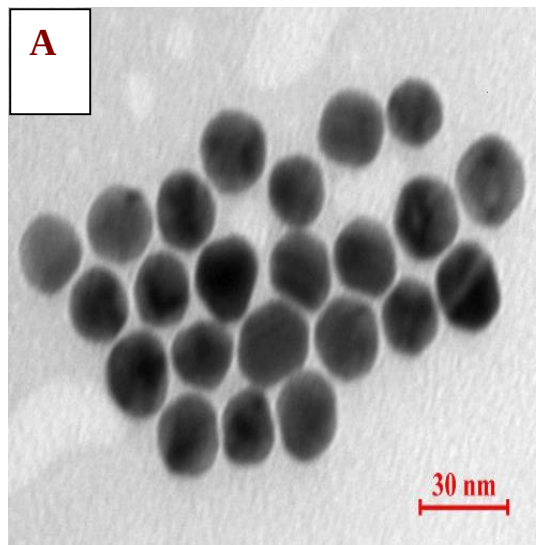


C

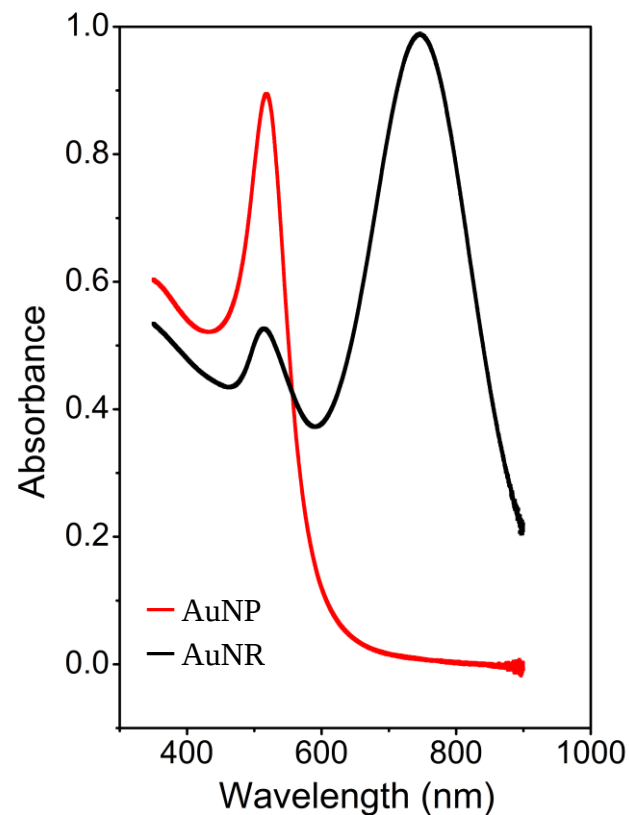
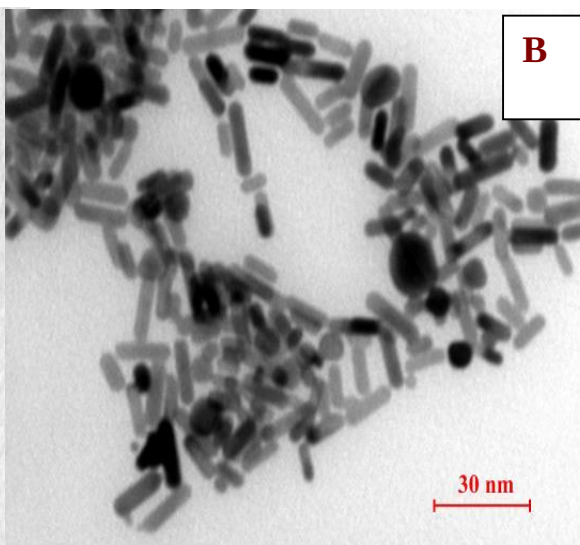


mercaptoethanol - biphenyl-4,4'-dithiol - cysteamine

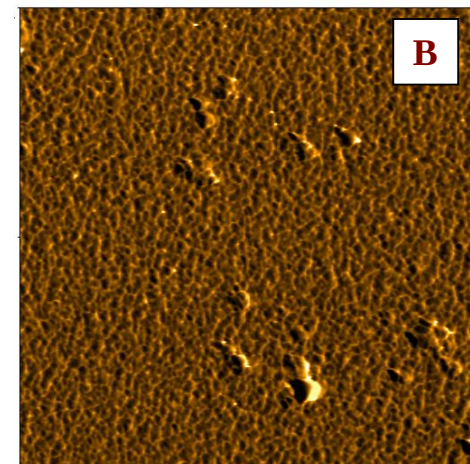
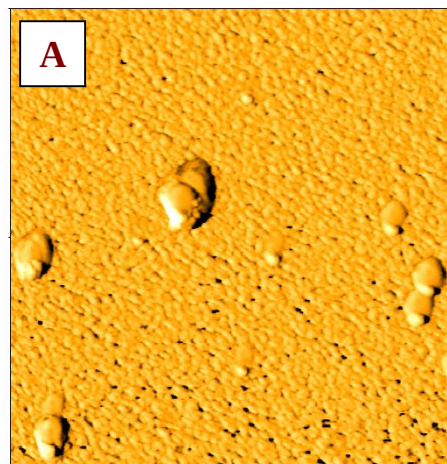
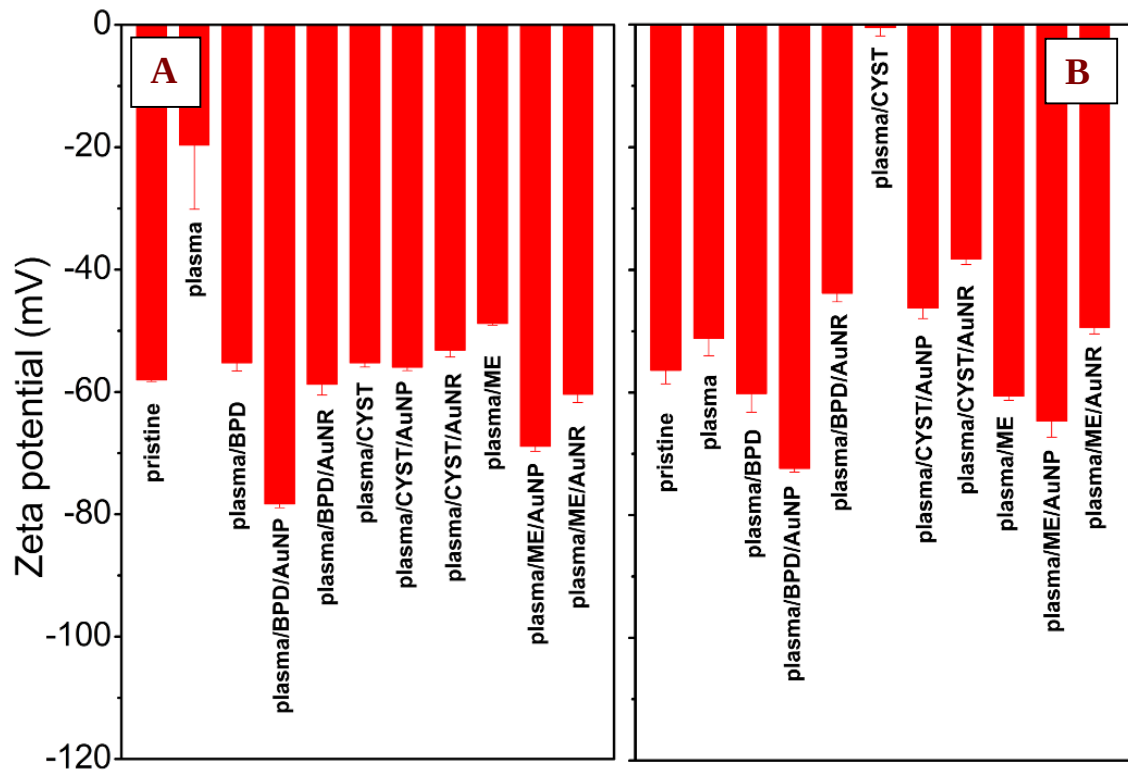
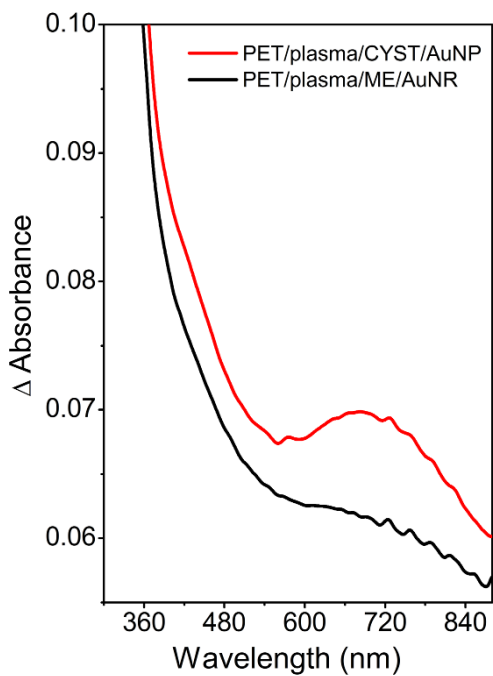
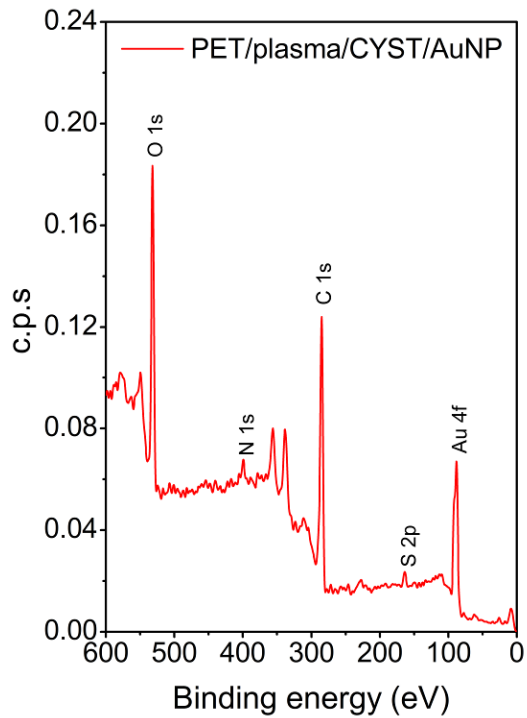
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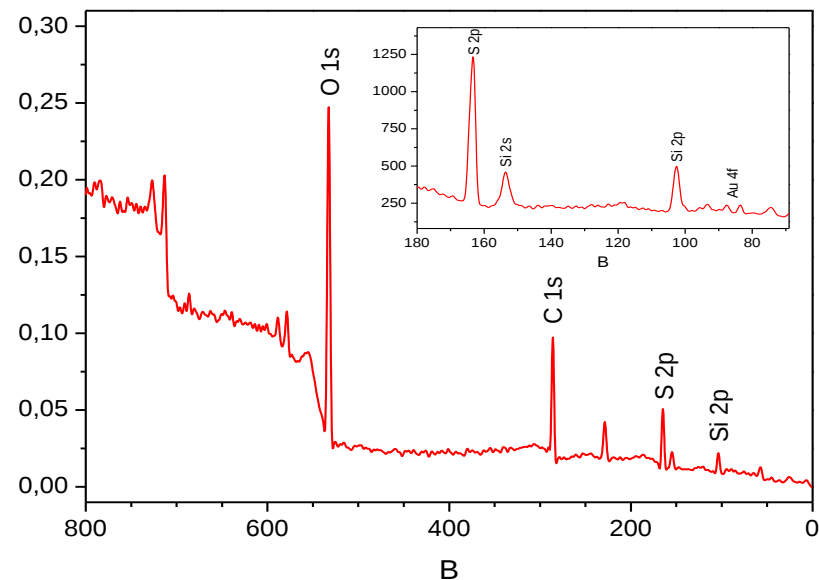
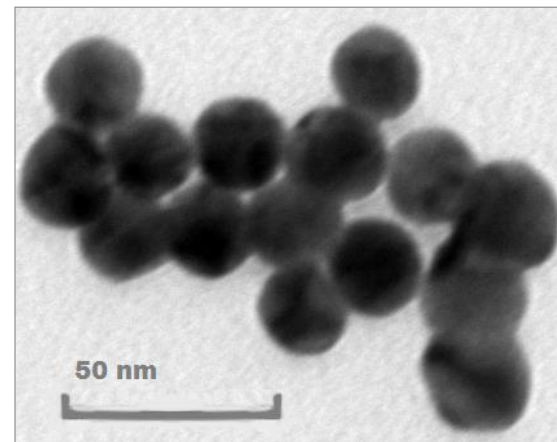
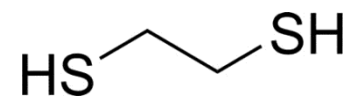
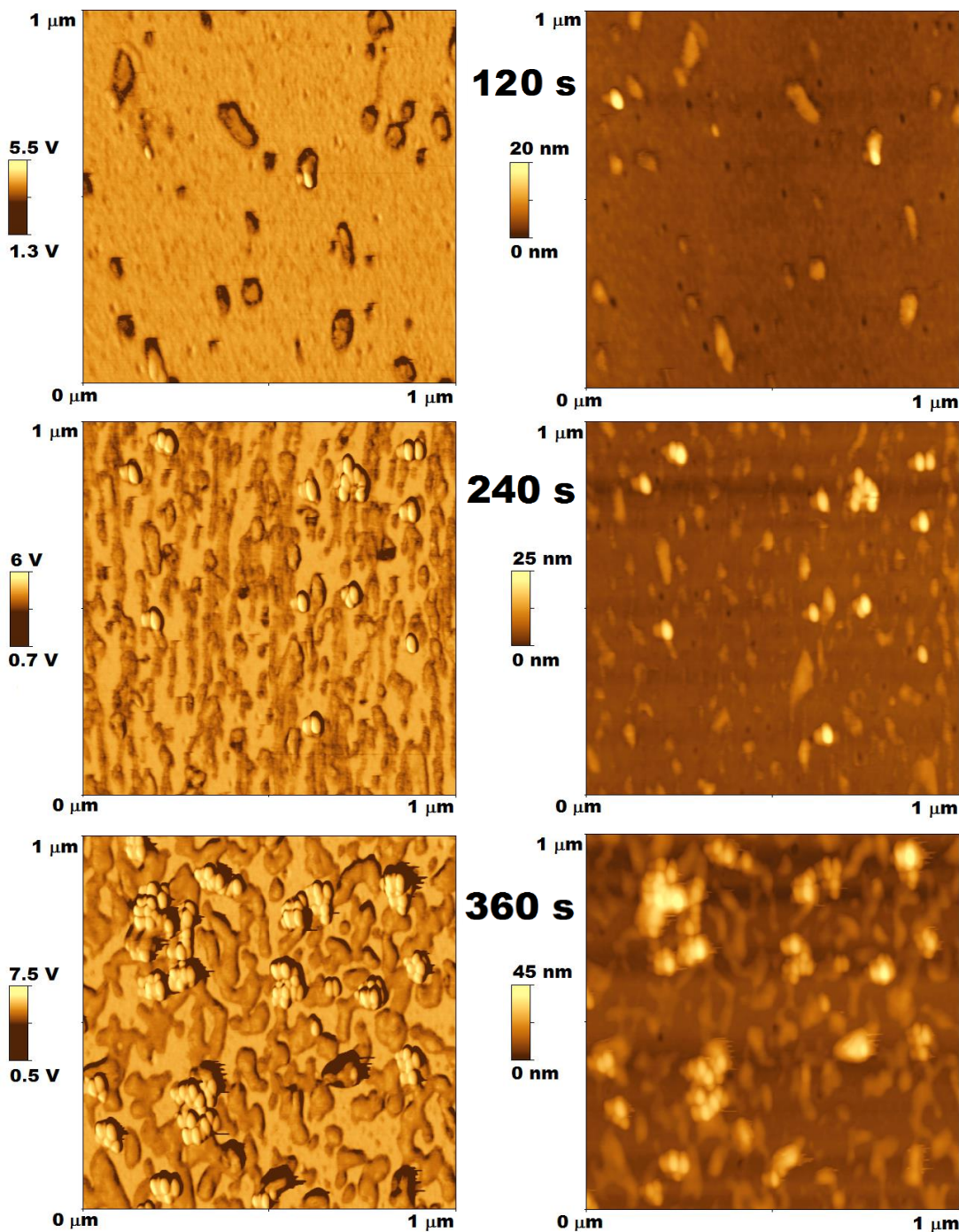
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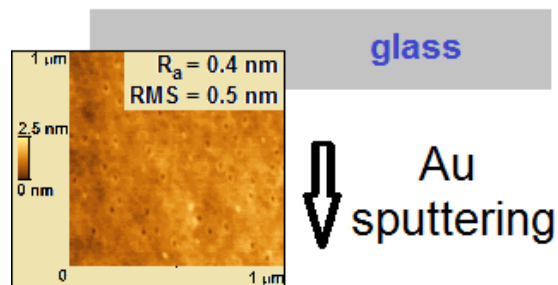
A.Řezníčková, Z.Kolská, J.Siegel, V.Švorčík,
J. Mater. Sci. 47, 17 (2012).



cysteamine and AuNPs -- mercaptoethanol and AuNRs



O.Kvítek, I.Bot, V.Švorčík, Appl. Surf. Sci. 258 (2012) 8991- 8995



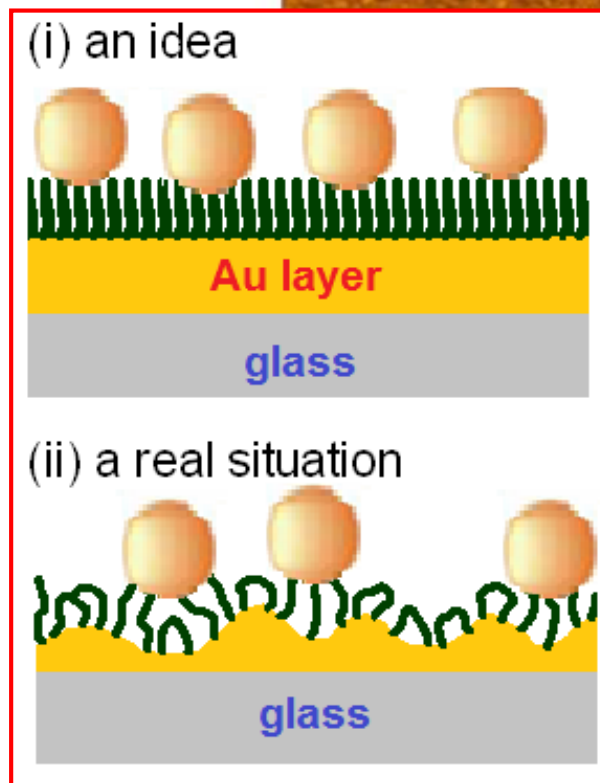
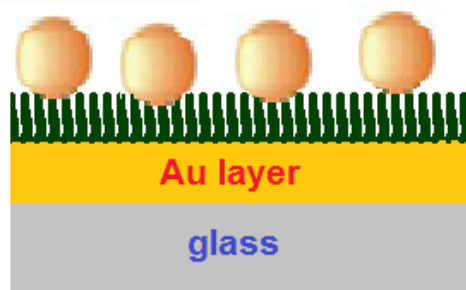
↓ Au sputtering



HS(CH₂)₈SH ↓ ODT treatment

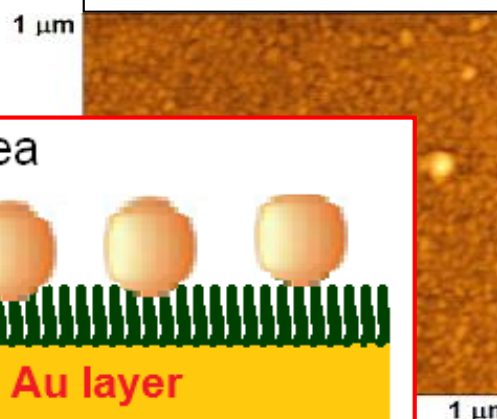


50 nm ↓ AuNPs grafting



As deposited

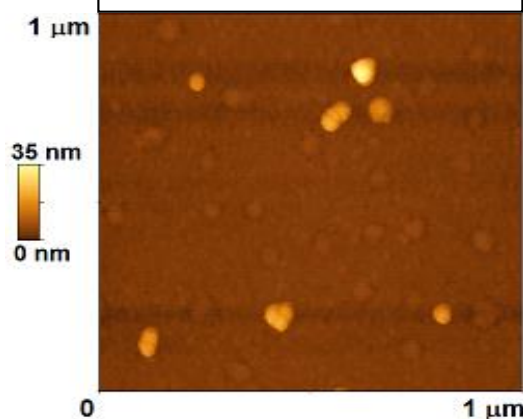
$R_a = 0.6 \text{ nm}$
 $RMS = 0.9 \text{ nm}$



AuNPs grafted

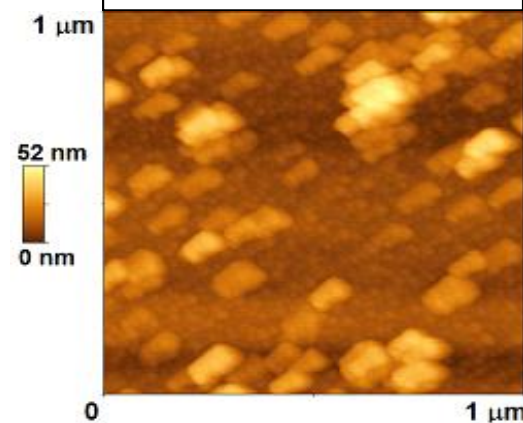
20 s deposition

$R_a = 0.8 \text{ nm}$
 $RMS = 2.0 \text{ nm}$



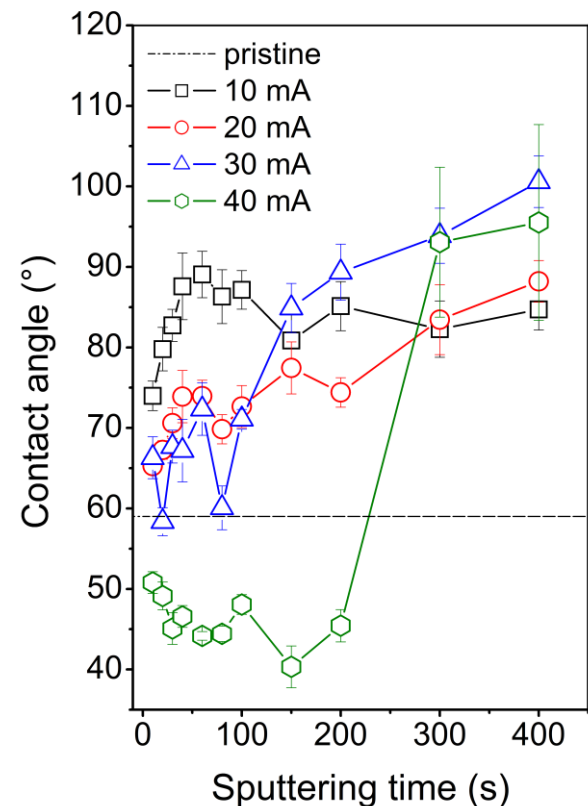
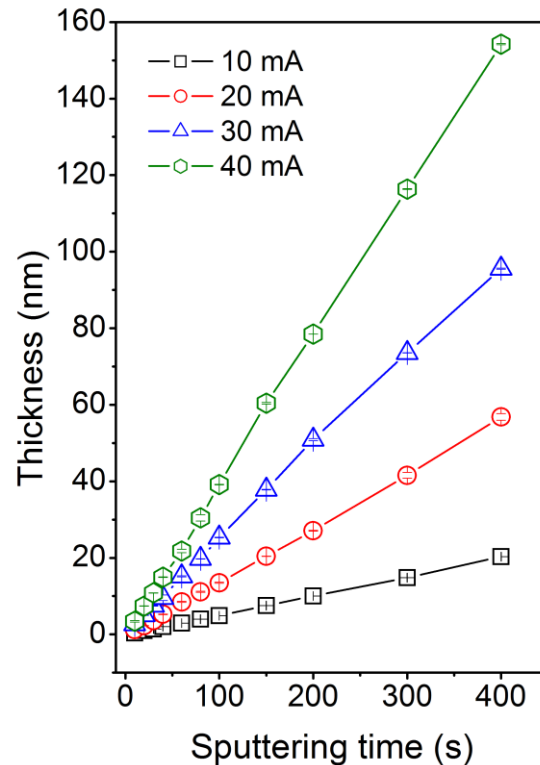
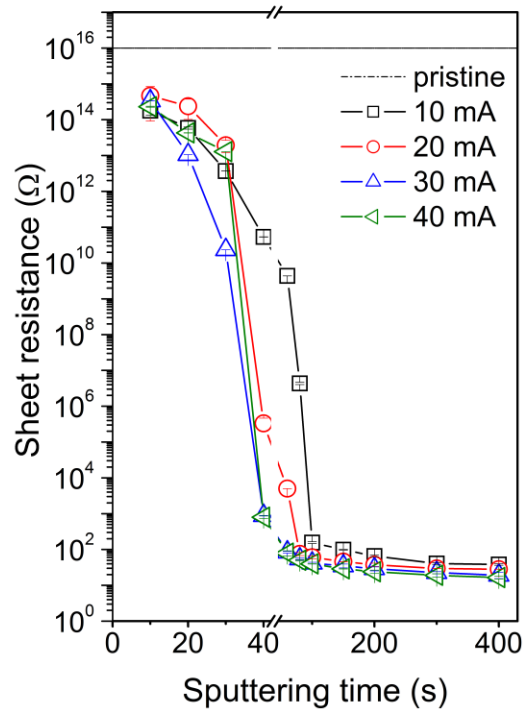
200 s deposition

$R_a = 6.2 \text{ nm}$
 $RMS = 8.2 \text{ nm}$

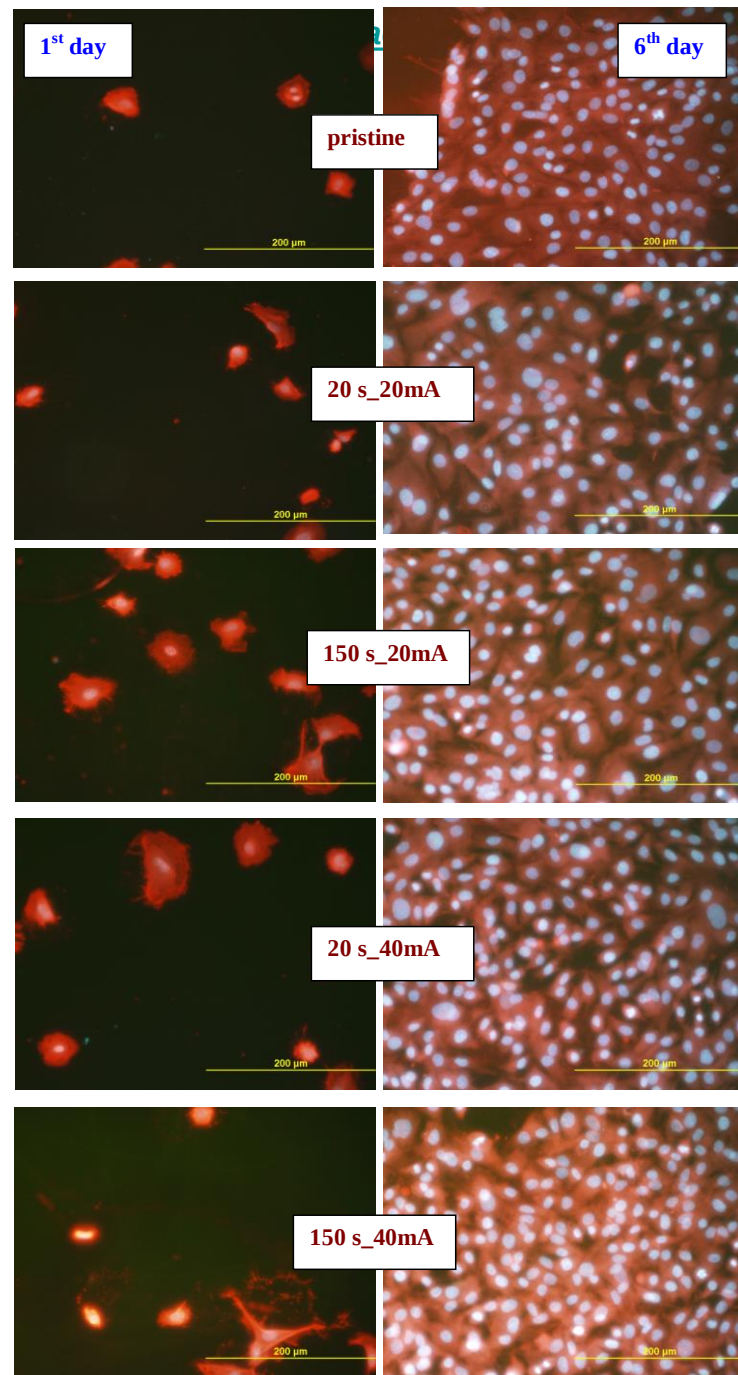
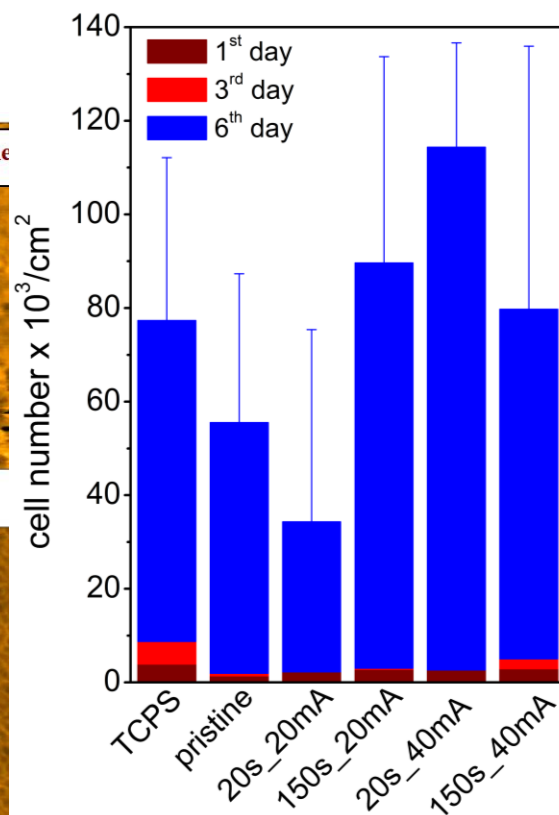
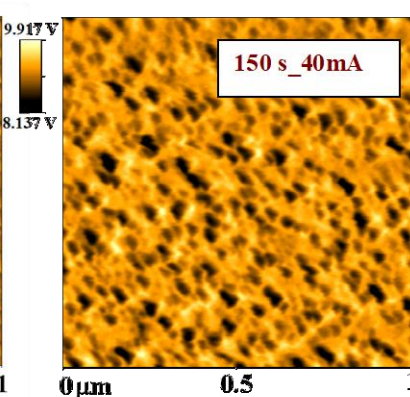
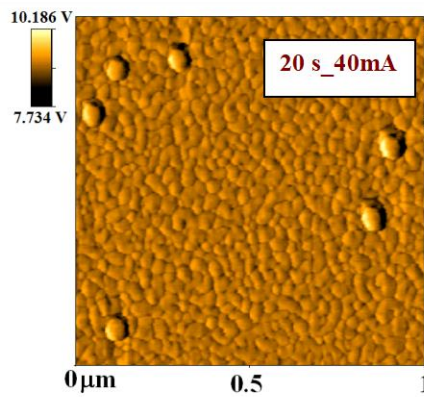
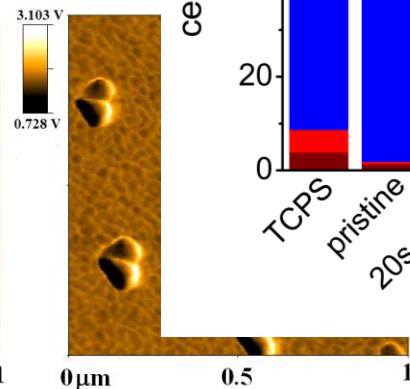
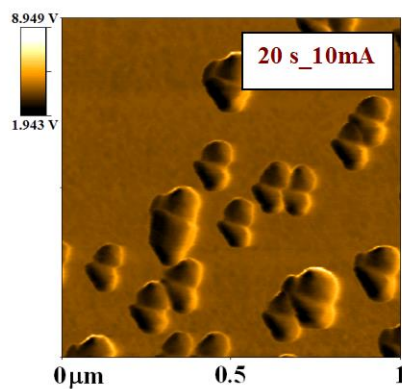
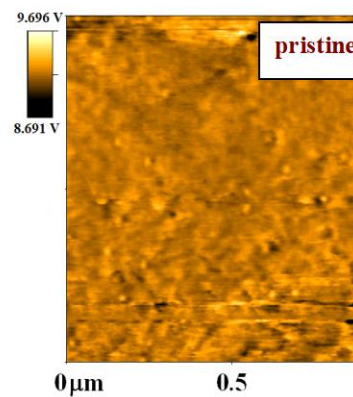


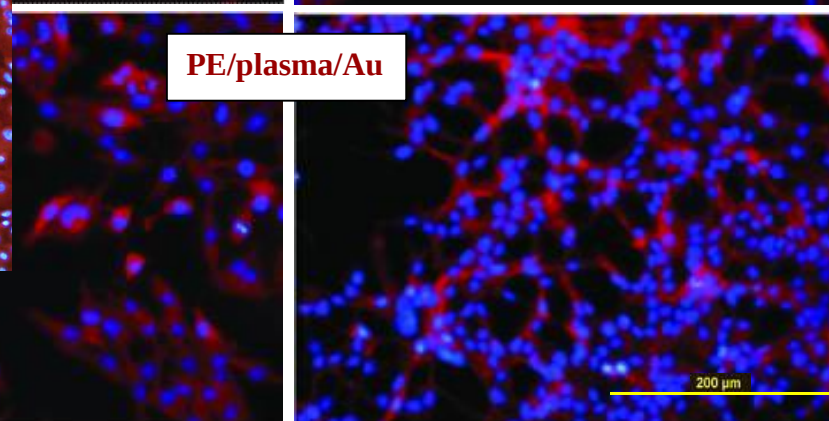
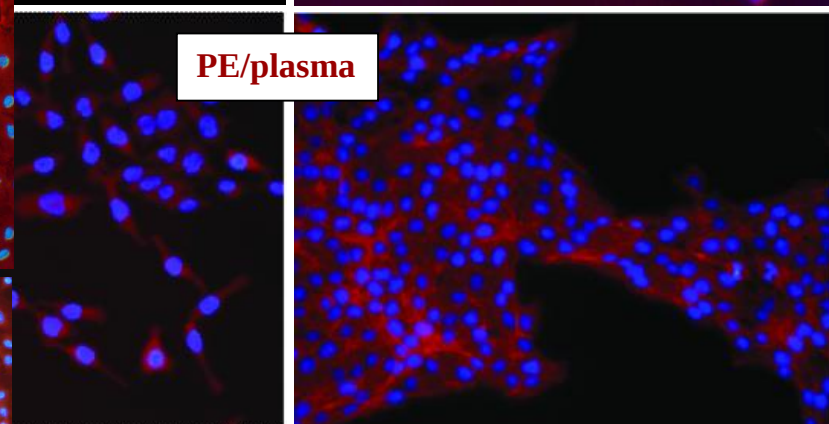
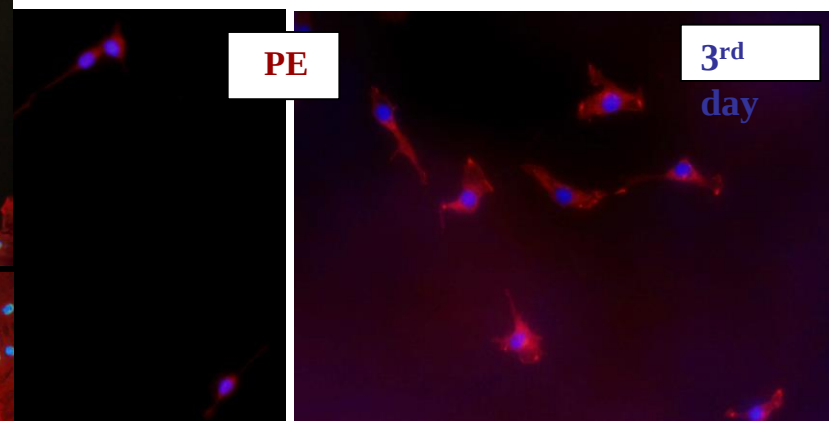
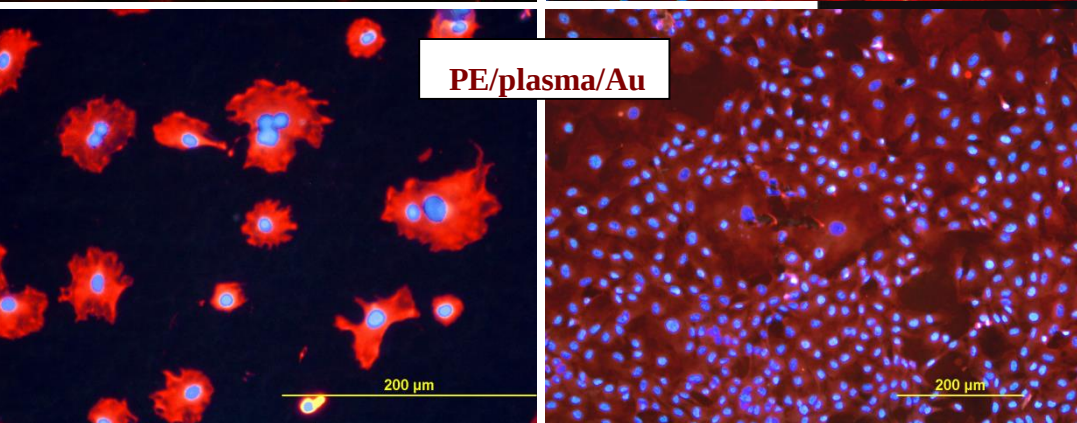
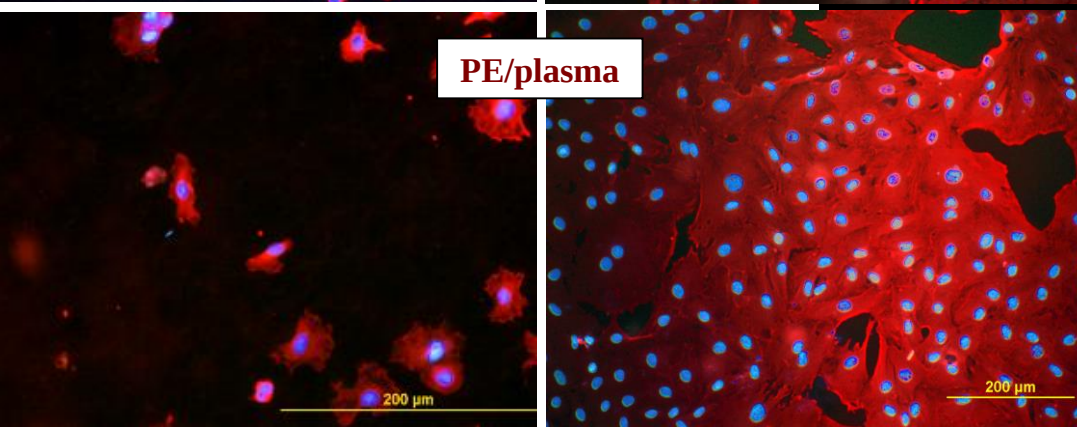
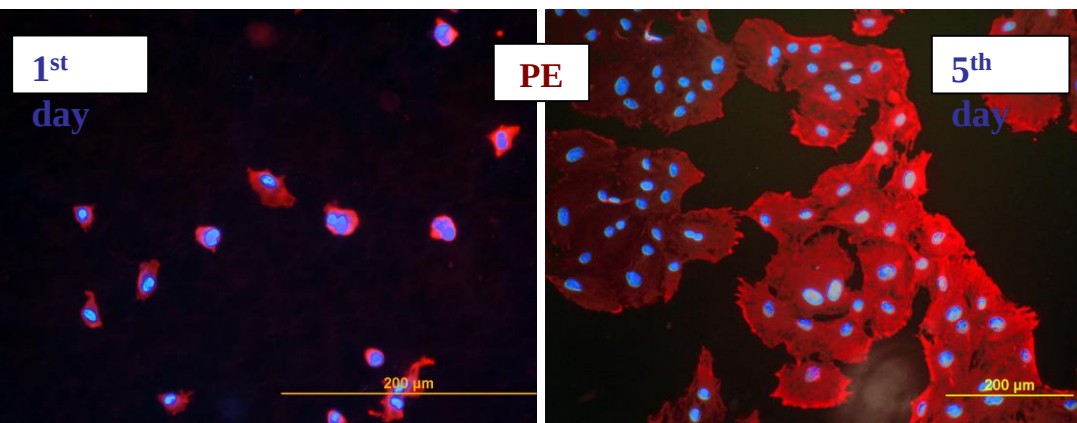
Au nanočástice na skle a buňky

V.Švorčík, vaclav.svorcik@vscht.cz

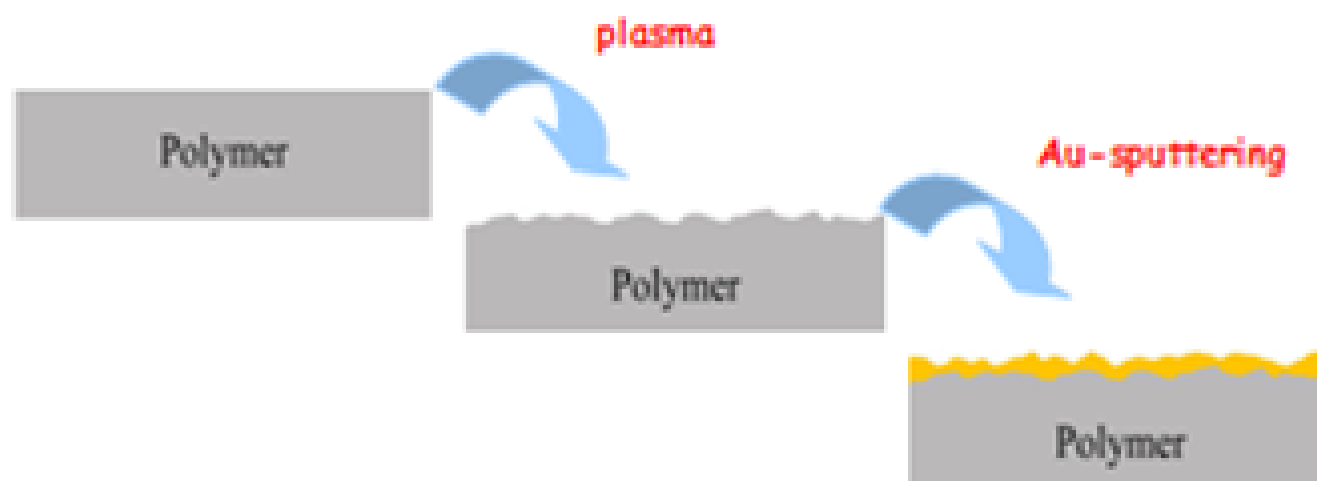


A.Reznickova, Z.Novotna, N.Slepickova Kasalkova, V.Svorcik,
J. Nanopar. Res. 2014, 9:305.



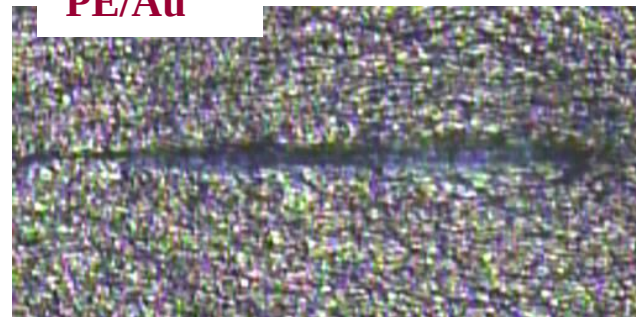


adheze Au na PE

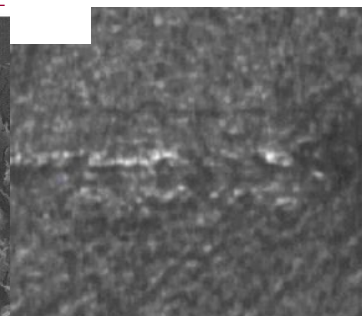
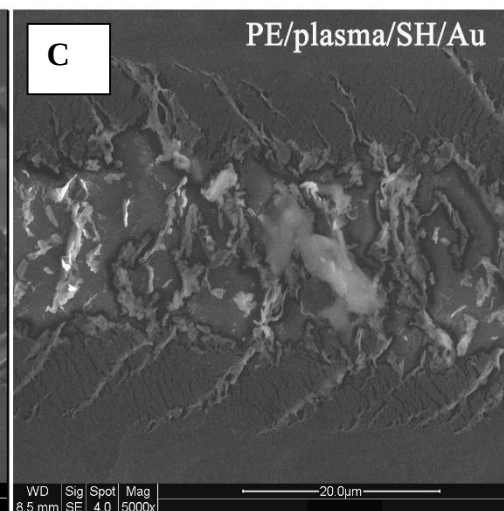
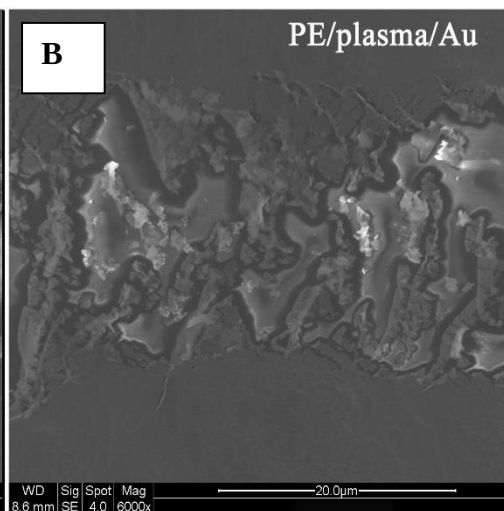
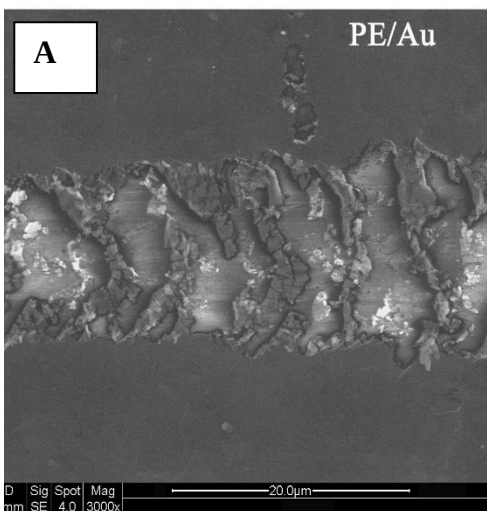




PE/Au



PE/plasma/Au



adhesive destruction

< < < <

cohesive destruction

V.Švorčík, A.Chaloupka, K.Záruba, V.Král, O.Bláhová,
A.Macková, Nucl. Instrum. Meth. B 267, 2484 (2009)

500 μm