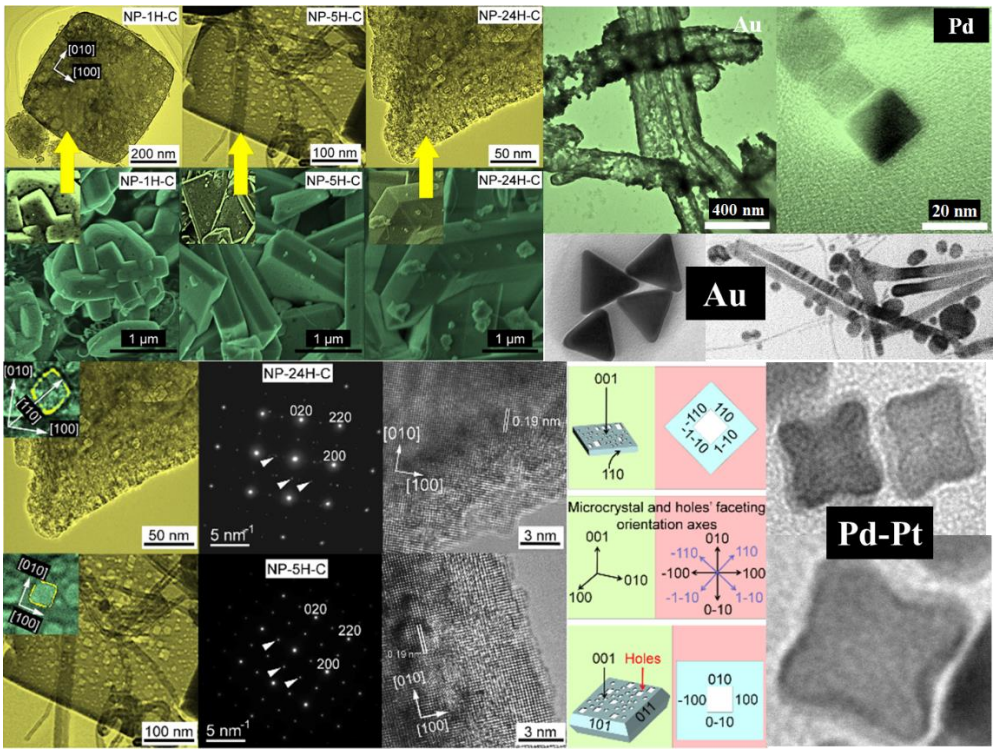
LABORATOR PENTRU STUDIUL MATERIALELOR UTILIZATE IN APLICATII FOTOCATALITICE

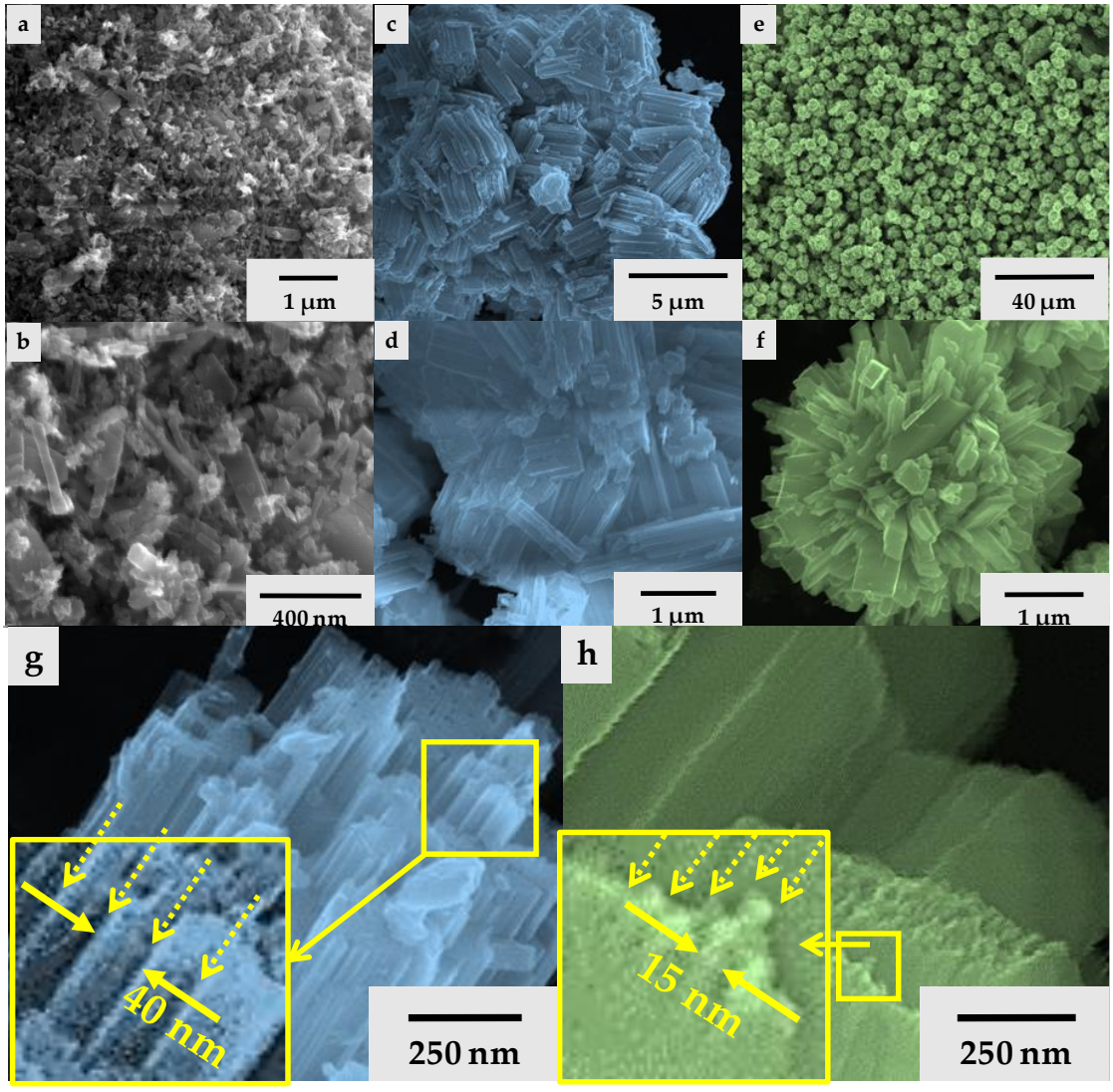
DESPRE NOI

Cercetarile efectuate in acest laborator sunt focalizate pe dezvoltarea de materiale utilizate la degradarea poluantilor organici si producerea de hidrogen prin fotocataliza. Activitatea desfasurata este directionata catre sinteza unor materiale compozite, evaluarea vitezei de fotodegradare a poluantilor (cu ajutorul spectroscopiei UV-vis) si evaluarea preliminara a compozitelor din perspectiva proprietatilor optice (determinarea Eg si identificarea fazelor cristaline cu ajutorul spectroscopiei de difuzie reflexie (DRS). Semiconductorii utilizati cel mai frecvent sunt TiO_2, WO_3 si Bi_2WO_6. In alcatuirea sistemelor compozite investigate sunt de asemenea folosite si alte materiale care au rolul de separator de sarcini electrice, cum ar fi metalele nobile (Pt, Pd si Au). Mai jos sunt prezentate cateva exemple/rezultate din studiile recente ale grupului.

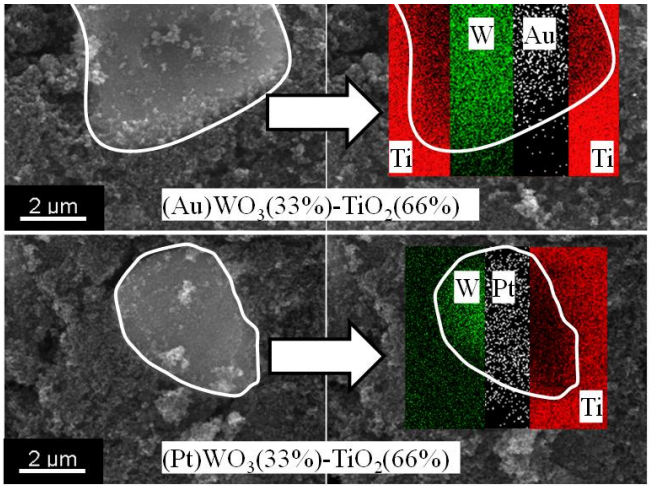
Nanostructuri cu forme controlate de TiO_2 (stanga) si metale nobile (dreapta) pentru aplicatii fotocatalitice

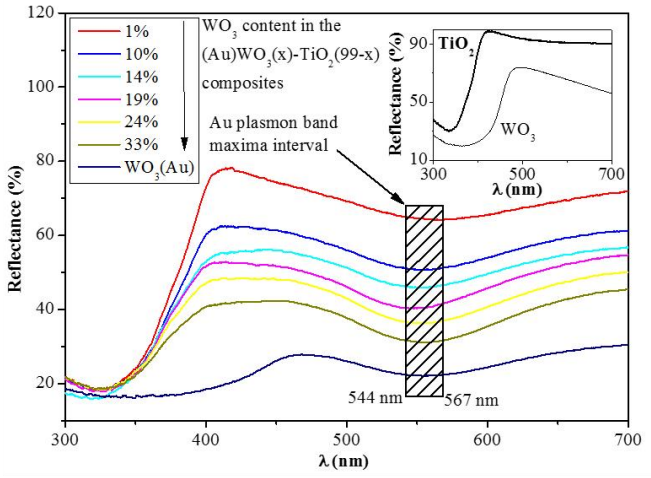


Nanostructuri cu forme controlate de WO_3 pentru aplicatii fotocatalitice

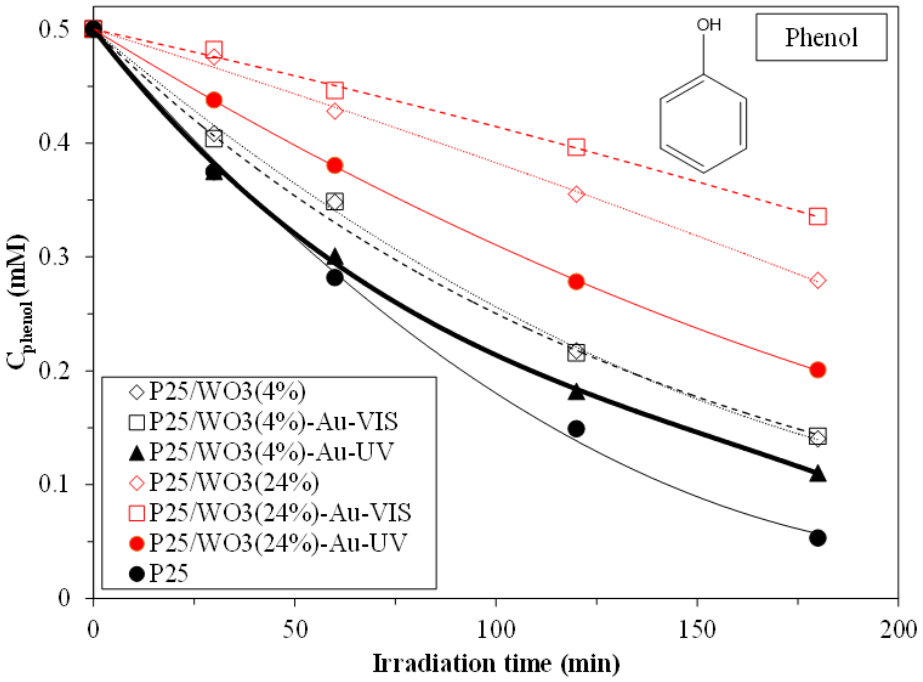


Fotodepunere selectiva de particule de metal nobil pe semiconductori de TiO_2 si WO_3 (stanga) si evaluarea compozitelor prin DRS (dreapta)





Performanta fotocatalitica a compozitelor de TiO_2/WO_3-Au



GRUPUL

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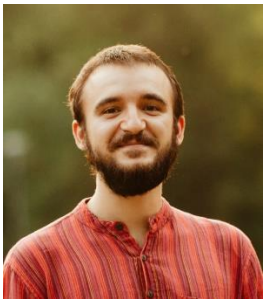

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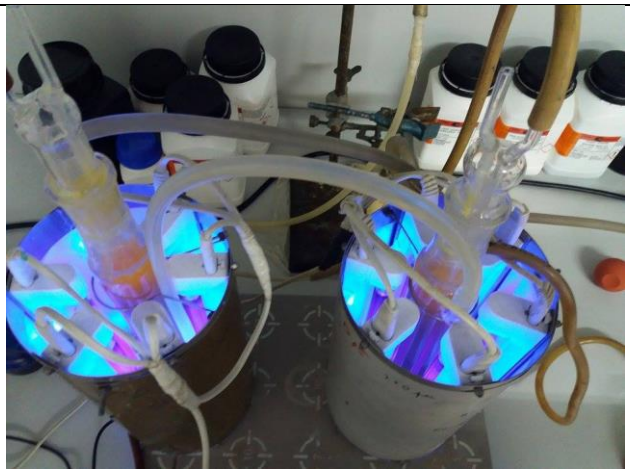
ECHIPAMENTE

Spectrofotometru Jasco-v650 couplat cu sfera integratoare (ILV-724)	
Fotoreactor (cu lampi UV si din domeniul vizibil)	
Uscator Tousimis Samdri®-PVT-3D (pentru uscare supracritica)	

Autoclava (pentru metoda hidrotermala)	
Centrifuga EBA 21	

SELECTIE DE PUBLICATII

Baia, L., Orbán, E., Fodor, S., Hampel, B., Kedves, E.Z., Saszet, K., Székely, I., Karácsonyi, É., Réti, B., Berki, P., Vulpoi, A., Magyari, K., Csavdári, A., Bolla, C., Coşoveanu, V., Hernádi, K., Baia, M., Dombi, A., Danciu, V., Kovács, G., Pap, Z., ***Preparation of TiO_2/WO_3 composite photocatalysts by the adjustment of the semiconductors' surface charge, (2016)*** *Materials Science in Semiconductor Processing,* ***42****, 66-71.*

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Vajda, K., Kása, Z., Dombi, A., Németh, Z., Kovács, G., Danciu, V., Radu, T., Ghica, C., Baia, L., Hernádi, K., Pap, Z., ***"crystallographic" holes: New insights for a beneficial structural feature for photocatalytic applications, (2015)*** *Nanoscale,* ***7*** *(13), 5776-5786.*

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Baia, L., Vulpoi, A., Radu, T., Karácsonyi, T., Dombi, A., Hernádi, K., Danciu, V., Simon, S., Norén, K., Canton, S.E., Kovács, G., Pap, Z., ***TiO_2/WO_3/Au nanoarchitectures' photocatalytic activity "from degradation intermediates to catalysts' structural peculiarities" Part II: Aerogel based composites - fine details by spectroscopic means, (2014)*** *Applied Catalysis B: Environmental,* ***148-149****, 589-600.*

Puskelova, J., Baia, L., Vulpoi, A., Baia, M., Antoniadou, M., Dracopoulos, V., Stathatos, E., Gabor, K., Pap, Z., Danciu, V., Lianos, P., ***Photocatalytic hydrogen production using TiO_2-Pt aerogels, (2014)*** *Chemical Engineering Journal,* ***242****, 96-101.*

Kovács, G., Baia, L., Vulpoi, A., Radu, T., Karácsonyi, T., Dombi, A., Hernádi, K., Danciu, V., Simon, S., Pap, Z., ***TiO_2/WO_3/Au nanoarchitectures' photocatalytic activity, "from degradation intermediates to catalysts' structural peculiarities", Part I: Aeroxide P25 based composites, (2014)*** *Applied Catalysis B: Environmental,* ***147****, 508-517.*

PROIECTE DE CERCETARE

PROIECTE DE CERCETARE INTERNATIONALE:

Proiect COST 540 **- Photocatalytic technologies and novel nanosurfaces materials-critical issues –PHONASUM,** *2006-2010.*

Proiect bilateral Romania-Uungaria, RO-HU 7/2013 **- The synthesis of TiO2, WO3, noble metal (Au, Pt) and carbon nanotube containing composite materials with differently shaped nanocrystals. A "chess game in materials science",** *2013-2015.*

Proiect bilateral Romania-Grecia, RO-GR **- Efficient wastewater treatment with nanocrystalline transient metal oxides modified with noble metals and nonmetals,** *2012-2014.*

Proiect ERANET **- Smart functions of packages containing nano-structured materials in food preservation (SMARTPACK),** *2014-2015.*

Proiect bilateral Romania-Ungaria, RO-HU 21/2008 **- Preparation and Characterization of Visible Light Activated Photocatalysts for Water and Air Decontamination,** *2008-2009.*

Proiect bilateral Romania-Bulgaria de cooperare in regiunea Marii Negre **- Synthesis, physicochemical and morphological characterization and toxicity testing of titanium dioxide (TiO_2) and silica dioxide (SiO_2) polymeric nanoparticles with respect to their application as drug carriers,** *2005-2007.*

PROIECTE DE CERCETARE NATIONALE:

Proiect PN-II-Idei 306/2011 **- Designul unor nanoarhitecturi compozite pentru producerea de hidrogen si depoluarea mediului,** *2011-2016.*

Grant GTC-UBB **– Grant pentru tineri cercetatori – Sinteza de structuri de Bi_2WO_6 de dimensiuni micro- si nano-metrice pentru aplicatii fotocatalitice,** *2016-2017.*

Grant GTC-UBB **– Grant pentru tineri cercetatori– Sinteza inovativa a nanocompozitelor de TiO_2/WO_3/Au pentru decontaminarea fotocatalitica a apei si producerea de H_2,** *2013-2014.*

Proiect CEEX-ET 5911/2006 **- Noi nano-compozite pe baza de aerogel de TiO_2 si metale nobile cu aplicatii la purificarea si monitorizarea calitatii apei,** *2006-2007.*