ΙΤΕ/ΙΕΧΜΗ

ΣΕΜΙΝΑΡΙΟ

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ΟΜΙΛΗΤΗΣ: **Χρήστος Αγγελόπουλος**, Μεταδιδακτορικός Ερευνητικός Συνεργάτης ΙΤΕ/ΙΕΧΜΗ

ΘΕΜΑ: **Advanced methods for soil and water remediation**

ΤΟΠΟΣ: Αίθουσα Σεμιναρίων ΙΤΕ/ΙΕΧΜΗ

ΗΜΕΡΟΜΗΝΙΑ: **Παρασκευή, 8 Δεκεμβρίου 2017**

ΩΡΑ: **17:00**

ΠΕΡΙΛΗΨΗ

Soil and water pollution by several classes of pollutants (e.g. pesticides, petroleum cuts, pharmaceuticals, etc.) is often caused by industrial activity and urbanization, improper disposal of chemical and industrial waste, downward migration of leachates from landfills and oil spills from accidents.

In the first part of the seminar, non-thermal plasma (NTP) of electrical discharges will be presented as a advanced oxidation process (AOP) for the sustainable and efficient removal of pollutants from contaminated soil. Dielectric barrier discharge (DBD) reactors differing with respect to electrode configuration (cylinder-to-plane and plane-to-grid) and operating with air at atmospheric pressure were constructed and used to remove solid and liquid pollutants (i.e. synthetic NAPL, dichloropyridine, atrazine) from soil layers. Experiments were performed at high (i.e. 10kHz) and low (i.e. 100-300 Hz) discharge frequency where a maximum gas temperature close to 300 ^{o}C and 40 ^{o}C, respectively, was recorded.

The power consumption was of the order of a few Watts and therefore DBD plasma seems as a well-promising technology for the cost-effective remediation of contaminated soils. GC-FID, HPLC, FTIR, GC-MS and on-line gas detectors were used to quantify the residual pollutant in soil after plasma treatment, identify the main intermediate products of initial pollutant oxidation , suggest potential degradation pathways, and detect the composition of exhaust gases. The effects of operating parameters (e.g. treatment time, applied voltage, soil moisture, gas flow rate) on the pollutant removal efficiency and pollutant oxidation byproducts in soil were elucidated.

In the second part of the seminar, photocatalytic processes and bio-adsorbents will be presented as wastewater treatment methods. A photocatalytic reactor was constructed and a variety of semiconductors were tested as photocatalysts for the degradation of several classes of organic pollutants (i.e. pharmaceuticals and dyes) in aqueous solutions, revealing the superiority of ZnO compared to the other catalysts. Furthermore, the influence of surface and bulk defects of both ZnO and TiO_2 powder on their PC activity was investigated. Bio-adsorbents were prepared from agricultural waste materials in their natural form or after minor physical activation (e.g. pistachio shells, banana peels, cucumber peels, potato peels), characterized in-depth, and evaluated with respect to their capacity to remove heavy metals and cationic/anionic dyes from aqueous solutions.

Future research plans, combining the knowledge gained by the aforementioned research activities, will be presented: ex-situ soil/waste treatment at large scale & in-situ soil/groundwater remediation by plasma discharges, plasma-catalytic treatment of polluted soil/water/gas, in-situ regeneration of bio-adsorbents by plasma, and seed germination/food quality improvement through plasma treatment.

ΣΥΝΤΟΜΟ ΒΙΟΓΡΑΦΙΚΟ

Dr. Christos Aggelopoulos is a Research Associate at FORTH/ICE-HT. He is Physicist (Dpt. Physics, U. Patras) and holder of M.Sc. in Environmental Sciences (2004), and Ph.D. on Multiphase Transport Properties of Soils (2007), both from U. Patras (Dpt. Physics). He has been Post-Doctoral Fellow and Research Associate at FORTH/ICE-HT (2008, 2010-2012), Institut Français du Pétrole Energies Nouvelles-IFPEN, France (2009-2010), Université Pierre et Marie Curie – École Nationale Supérieure de Chimie de Paris, France (2012-2014). His research activities are focused on (i) multiphase flow and transport phenomena in porous media with application to liquid pollutants spreading in subsurface, (ii) remediation of polluted soil/groundwater and waste treatment by non-thermal plasma, (iii) wastewater treatment by photocatalysis and bio-adsorbents and (iv) CO_2 storage in deep saline aquifers and environmental impacts. He has participated in 12 R&D projects funded by the EU and the GSRT. He has been the co-author of several proposals submitted in national/EU research funding calls. He was the Principal Investigator (PI) of the research project SOIL-PLASMA, which was among the eight cited as most-promising projects in the 2013 ESPA report. For this research he was awarded the 2nd Prize in the category "Applied Research" of the 3rd "Greece Innovates!" Applied Research & Innovation Competition (2016). In 2014, he was elected as Principal Researcher in the Geosciences Division of IFPEN (declined the offer staying as Research Associate at FORTH/ICE-HT with funding from NSRF-KRHPIS and SOIL-PLASMA). He has published 33 articles (11 as corresponding author) in refereed Scientific Journals [h index: 11 (Web of Science)], 1 monograph, 1 Patent and 45 papers in international and national conference proceedings. He has co-advised undergraduate/graduate students and he is teaching as Adjunct Academic Staff in the Postgraduate Studies Programs “Environmental Design of Infrastructure Works ” (Hellenic Open University) and “Catalysis, Environmental Protection and Clean Energy Production” (Dpt. of Chemistry, U. Patras).