

NEWSLETTER

August
23

Υβριδικό μοντέλο επεξεργασίας
στραγγισμάτων ΧΥΤΑ συνδυάζοντας
τη χρήση Προχωρημένων
Οξειδωτικών Διεργασιών
Αντιρρύπανσης (ΠΟΔΑ) και την
τεχνολογία των μεμβρανών



UV-LEACH

«ΕΡΕΥΝΩ – ΔΗΜΙΟΥΡΓΩ – ΚΑΙΝΟΤΟΜΩ»



«ΕΡΕΥΝΩ – ΔΗΜΙΟΥΡΓΩ – ΚΑΙΝΟΤΟΜΩ»
Β' ΚΥΚΛΟΣ



UV-LEACH



Ευρωπαϊκή Ένωση
Πρόγραμμα Ανάπτυξης



Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης



ΤΜΗΜΑ ΧΗΜΕΙΑΣ
ΑΡΙΣΤΟΤΕΛΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΟΝΙΚΗΣ

ΚΕΔΕΚ
ΚΕΝΤΡΟ ΕΛΕΓΧΟΥ ΚΑΙ ΠΡΟΛΗΨΗΣ ΕΠΙΧΕΙΡΗΣΙΑΚΗΣ ΚΑΙΝΟΤΟΜΙΑΣ Α.Ε.



Διαδύμα
ΔΙΑΔΥΜΑ ΑΝΩΤΑΤΟ ΔΙΔΑΚΤΙΚΟ ΚΕΝΤΡΟ Α.Ε.

**ΕΛΛΗΝΙΚΟ
ΑΝΟΙΚΤΟ
ΠΑΝΕΠΙΣΤΗΜΙΟ**

Υβριδικό Μοντέλο Επεξεργασίας στραγγισμάτων ΧΥΤΑ

15 προφορικές και αναρτημένες ανακοινώσεις
Σε διεθνή συνέδρια

11th European Conference on Pesticides and Related Organic Micropollutants in the Environment & the 17th Symposium on Chemistry and Fate of Modern Pesticides (Ioannina 23-26, June)



POSTER PRESENTATIONS



UV-LEACH

CONFERENCES

“LANDFILL LEACHATE TREATMENT USING UV-FENTON PROCESSES AND COAGULATION AS A PRETREATMENT STEP”

P. Parthenidis¹, E. Evgenidou^{1,2}, D. Lambropoulou^{1,2}

“A HIGH- RESOLUTION MASS SPECTROMETRY-BASED INTEGRATED WORKFLOW FOR THE TARGET ANALYSIS AND SUSPECT SCREENING OF PER- AND POLYFLUOROALKYL SUBSTANCES IN WASTEWATERS AND LEACHATES”

L-A. Koronaiou^{1,2}, C. Nannou^{1,2}, D. Bikiaris³, D. Lambropoulou^{1,2}

“SULFATE RADICAL-BASED AOPS FOR THE REMOVAL OF PROPRANOLOL FROM WATER AND HIGHLY CONTAMINATED AQUEOUS MATRICES”

A. Maliogka¹, A. Rapti¹, E. Evgenidou^{1,2}, D. Lambropoulou^{1,2}

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ΕΠΙΧΕΙΡΗΣΙΑΚΗΣ ΚΑΙΝΟΤΟΜΙΑΣ

ΕΠΑΝΕΚ 2014-2020
ΕΥΡΩΠΑΪΚΟ ΠΡΟΓΡΑΜΜΑ
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Διαδύμα
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BY THE Hellenic Society
of Environmental Chemistry

ΕΛΛΗΝΙΚΟ
ΑΝΟΙΚΤΟ
ΠΑΝΕΠΙΣΤΗΜΙΟ

Υβριδικό Μοντέλο Επεξεργασίας στραγγισμάτων ΧΥΤΑ

18th Annual Workshop On Emerging High-Resolution Mass Spectrometry (HRMS) And LC-MS/MS Applications In Environmental Analysis And Food Safety (Barcelona 10-11, October)



ORAL PRESENTATIONS



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ΣΥΝΕΔΡΙΑ

“LC–HRMS SUSPECT SCREENING WORKFLOW TO ELUCIDATE TRANSFORMATION PRODUCTS OF LINCOMYCIN AFTER PHOTOCATALYTIC ABATEMENT USING MOF-BASED PHOTOCATALYSTS ”

D. Lambropoulou^{1,2}, E. Evgenidou^{1,2}, C. Nannou^{1,2}, A.
Kontogiannis¹, D. Bikiaris³

“COMPACT SUSPECT SCREENING WORKFLOW FOR THE ELUCIDATION OF TPS OF THE DIURETIC DRUG FUROSEMIDE”

L-A. Koronaίου^{1,2}, C. Nannou^{1,2}, M. García Valverde⁴,
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«ΕΡΕΥΝΩ – ΔΗΜΙΟΥΡΓΩ – ΚΑΙΝΟΤΟΜΩ»
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ΕΠΙΧΕΙΡΗΣΙΑΚΟ ΠΡΟΓΡΑΜΜΑ
ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΔΙΑ ΒΙΩΣΙΜΗΣ
ΑΝΑΓΚΗΣ

ΕΣΠΑ
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Διαδύναμη
ΑΝΑΡΧΙΤΕΛΕΣ ΕΡΕΥΝΗΤΙΚΟΙ
ΟΡΓΑΝΙΣΜΟΙ

ΕΛΛΗΝΙΚΟ
ΑΝΟΙΚΤΟ
ΠΑΝΕΠΙΣΤΗΜΙΟ



Υβριδικό Μοντέλο Επεξεργασίας στραγγισμάτων ΧΥΤΑ



5th Iberoamerican Conference on Advanced Oxidation Technologies (Cusco-Peru 7-11, November)



ΣΥΝΕΔΡΙΑ

**“LC–HRMS SUSPECT SCREENING WORKFLOW TO
ELUCIDATE TRANSFORMATION
PRODUCTS OF LINCOMYCIN AFTER
PHOTOCATALYTIC ABATEMENT USING
MOF-BASED PHOTOCATALYSTS”**

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ORAL PRESENTATION



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UV-LEACH



Ευρωπαϊκή Ένωση
Ευρωπαϊκό Ταμείο
Περιφερειακής Ανάπτυξης



Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης



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ΚΕΝΤΡΟ ΕΡΕΥΝΑΣ ΚΑΙ ΤΕΧΝΟΛΟΓΙΚΗΣ ΑΝΑΠΤΥΞΗΣ



ΕΛΛΗΝΙΚΟ
ΑΝΟΙΚΤΟ
ΠΑΝΕΠΙΣΤΗΜΙΟ



Υβριδικό Μοντέλο Επεξεργασίας στραγγισμάτων ΧΥΤΑ

ΔΗΜΟΣΙΕΥΣΕΙΣ

10 δημοσιεύσεις

Σε έγκριτα διεθνή επιστημονικά περιοδικά

Available Online for the Environment 2 (2023) 100020

Contents lists available at ScienceDirect

Sustainable Chemistry for the Environment

Journal homepage: www.elsevier.com/locate/sce

Photo-catalytic degradation of the antidepressant drug bupropion. Performance, water matrix effect and identification of transformation products

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ARTICLE INFO

Keywords: Bupropion; Antidepressant; Photo-catalysis; Transformation products

ABSTRACT

The photo-catalytic degradation of the antidepressant drug bupropion (BP) was studied using TiO₂ as catalyst. Complete removal of the target compound is achieved within 60 min of treatment and the effect of various operational parameters like the reaction time, the initial concentration of the drug or the pH of the reaction medium, have been evaluated. The influence of various toxic or organic compounds usually present in natural waters like nitrate or nitrite ions and heavy metal ions, was also investigated revealing a negative impact on the photo-catalytic degradation process. Accordingly, the degradation of BP was also evaluated in different water matrices like wastewater effluents or landfill leachate showing dependence to nitrate ions. Finally, employing high-resolution mass spectrometry, 20 transformation products (TPs) have been identified 24 out of which have been proposed for the first time.

1. Introduction

Pharmaceutically active compounds and personal care products (PPCPs) are used by humans as well as animals and are not completely metabolized but also excreted in urine or in the form of metabolites into aquatic environments. However, these chemicals are not introduced in the environment only as a result of human and animal consumption, but also as residues from manufacturers and hospitals [1]. This is attributed to the fact that after their release into wastewater treatment systems and based on the chemical structure of the compounds, the majority of them are not eliminated by the usual biological processes employed in conventional sewage treatment plants, which are described as major source of PPCPs into surface water systems [2]. Consequently, a number of studies have reported their presence in pharmaceutical residues in the environment [3].

However, Advanced Oxidation Processes have been applied with great success to obtain a large number of PPCPs [4–16]. Among the various applied AOPs, heterogeneous photo-catalysis seems promising technology which has already been proved as an affordable, environmentally friendly, and sustainable technology for various chemical transformations, based on its selectivity, low price, stability and

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molecules

Article

Incorporation of Metal-Based Nanoaddives into the PLA Matrix: Effect of Surface Properties on Antibacterial Activity and Mechanical Performance of PLA Nanoaddived Films

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Keywords: Nanoparticles; Nanocomposites; Mechanical properties; Antibacterial activity; Surface properties; PLA matrix

ABSTRACT

In this work, the modification process of poly(lactic acid) (PLA) with metal-based nanoparticles (NPs) additive (Ag, ZnO, TiO₂) at different loadings (0.5, 1.0 and 1.5 wt%) and by matrix entrapment method followed by film formation as one of the advanced techniques for industrial application have been investigated. PLA nanocomposite composite films (PLA-NPs) of PLA/Ag, PLA/ZnO, PLA/TiO₂ were fabricated, allowing convenient dispersion of NPs within the PLA matrix to further explore the challenge of investigating the surface properties of PLA. No mechanical plasticity (strain) for the final functional properties, such as antimicrobial activity and surface mechanical properties. The main objective was to study how the addition of NPs to the PLA during the melt extrusion process affects the chemistry, morphology, and wettability of the surface and its further influence on the antimicrobial efficacy and mechanical properties of the PLA-NPs. Therefore, the effect of Ag, ZnO, and TiO₂ NPs incorporation on the morphology (SEM), elemental mapping analysis (EDS), roughness, surface free energy (SFE) of PLA-NPs measured by geometry and calculated by Owens, Wendt, Rabinowitch, and Kaelble model was evaluated and correlated with the final functional properties such as antimicrobial activity and surface mechanical properties. The developed PLA-metal-based nanocomposites, with improved mechanical and antimicrobial surface properties, could be used as sustainable and biodegradable materials, offering scalable multifunctionalities not only for food packaging but also for cosmetics and hygienic products, as well as for broader plastic products where antimicrobial activity is desirable.

1. Introduction

The development of plastic packaging materials is an extremely thriving area of research that has driven rapid growth in recent years. The focus is on the improvement of materials, which, on the one hand, protect the product and extend its life, and on the other hand, have a biodegradable and functional aspect. In this regard, petroleum-based plastics such as polyethylene (PE), polypropylene (PP), polystyrene (PS) have experienced exponential growth every year due to the low cost, good barrier, and mechanical properties for packaging. Despite their good properties, the mechanical growth

Keywords: poly(lactic acid); nanoparticles; composite additive films; SEM analysis; surface free energy calculation; antibacterial activity; nanomodification

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Science of the Total Environment

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Photo-assisted transformation of furosemide: Exploring transformation pathways, structure database and suspect and non-target workflows for comprehensive screening of unknown transformation products in wastewater and landfill leachate

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HIGHLIGHTS

- Antidepressant, bupropion and its transformation into major transformation products.
- 25 newly proposed TPs were identified using HRMS data and an optimized workflow.
- 3 FT modes provided additional confirmation for proposed structures of 28 TPs.
- Coexistence of two TPs in wastewater with potential ecotoxicological implications.
- Workflow-based retrospective analysis in wastewater retained the presence of 6 TPs.

GRAPHICAL ABSTRACT

ARTICLE INFO

Editor: Deniz Bursalı

Keywords: Furosemide; Leachate; Wastewater; ecotoxicology; HRMS

ABSTRACT

In recent years, transformation products (TPs) of pharmaceuticals in the environment have received considerable attention. In this context, here, a controlled conversion of furosemide (FRO) in aqueous matrices caused by photo-oxidation is provided as a proof of concept. Hence, the primary goal of the study was to display an improved strategy for monitoring the target (parent molecular) and suspect remaining (SR) species (TPs) in order to build an inclusive high-resolution mass spectrometry (HRMS) database able to provide reference information (cheminformatics/spectra) for environmental investigations in complex matrices (wastewater/landfill leachate). One analysis was performed by optimizing a 2D workflow. Additional confirmation for the proposed structural elucidation was provided by comparing retention time to the proposed structure depicting low prediction errors. This approach was applied for the sensitive identification of 25 TPs of FRO, 20 of which were reported herein for the first time. Finally, 10 and non-target analysis (NTA) have been

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Διαδύμια
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ΑΝΕΡΓΕΙΑ ΣΤΟΧΑΡΙΣΤΙΚΑ

ΕΛΛΗΝΙΚΟ ΑΝΟΙΚΤΟ ΠΑΝΕΠΙΣΤΗΜΙΟ

Υβριδικό Μοντέλο Επεξεργασίας στραγγισμάτων ΧΥΤΑ

ΗΜΕΡΙΔΕΣ

2 Υβριδικές Ημερίδες

Για τη διάχυση των αποτελεσμάτων του έργου



Δελτίο Τύπου

Με ιδιαίτερη επιτυχία πραγματοποιήθηκε την Τρίτη 19 Ιουλίου 2022 Διεπιστημονικό Επιμορφωτικό Σεμινάριο στο πλαίσιο του έργου UV-LEACH με τίτλο «Τεχνολογίες Επεξεργασίας Υγρών Αποβλήτων. Προχωρημένες Οξειδωτικές Μέθοδοι - Σύνθεση νέων Φωτοκαταλυτικών Υλικών - Αναλυτικές Τεχνικές - Δοκιμές Τοξικότητας - Επαναχρησιμοποίηση Λυμάτων». Το σεμινάριο διοργανώθηκε από το τμήμα Χημείας του ΑΠΘ, σε συνεργασία με ΔΙΑΔΥΜΑ ΑΕ, τη Σχολή Θετικών Επιστημών και Τεχνολογίας του ΕΑΠ και την ΕΔΑΔΥΜ. Το σεμινάριο παρακολούθησαν φοιτητές, ερευνητές αλλά και συνεργάτες που εργάζονται σε συναφή ερευνητικά αντικείμενα.



Στο σεμινάριο πραγματοποιήθηκαν ομιλίες από τους εταίρους με θεματολογία:

- ✓ Η περιγραφή των στόχων και των δράσεων του έργου
- ✓ Ολοκληρωμένο Σύστημα Διαχείρισης Απορριμμάτων (ΟΣΔΑ) Δυτικής Μακεδονίας
- ✓ Έλεγχος επαναχρησιμοποίησης των επεξεργασμένων στραγγισμάτων σε εδάφη
- ✓ Στρατηγικές επεξεργασίας στραγγισμάτων και λυμάτων υψηλού ρυπαντικού φορτίου με τη χρήση Προχωρημένων Οξειδωτικών Μεθόδων Αντιρροπήσεως
- ✓ Σύνθεση νέων φωτοκαταλυτικών υλικών και εφαρμογές τους
- ✓ Προσδιορισμός ρυθμών στα στραγγίσματα με χρήση Φασματομετρίας Μάζας Υψηλής Διακριτικής Ικανότητας και εκτίμηση της τοξικότητας τους

Υπήρξε εξαιρετικά μεγάλο Υπήρξε εξαιρετικά μεγάλο ενδιαφέρον και ως εκ τούτου οι εταίροι και τα ενδιαφέροντα μέλη ανανέωσαν το ραντεβού τους σε μία πιθανή δια ζώσης συνάντηση σε επόμενη εκδήλωση του έργου. Για περισσότερες πληροφορίες του έργου μπορείτε να επισκεφθείτε την επίσημη ιστοσελίδα του <http://uv-leach.chem.auth.gr/>



UV-LEACH



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ΕΛΛΗΝΙΚΟ ΑΝΟΙΚΤΟ ΠΑΝΕΠΙΣΤΗΜΙΟ
ΑΝΑΛΥΤΙΚΩΣ ΚΑΙ ΕΡΕΥΝΗΤΙΚΩΣ

ΕΠΑΝΕΚ 2014-2020
ΕΠΙΧΕΙΡΗΣΙΑΚΟ ΠΡΟΓΡΑΜΜΑ
ΔΙΑΤΑΞΗΣ ΤΩΝ ΣΤΡΑΤΗΓΙΚΩΣ
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ΕΣΠΑ
2014-2020

Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης



ΤΜΗΜΑ ΧΗΜΕΙΑΣ
ΑΡΙΣΤΟΤΕΛΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΟΝΙΚΗΣ

ΚΕΔΕΚ
ΚΕΝΤΡΟ ΕΡΕΥΝΑΣ ΚΑΙ ΔΙΑΔΙΚΑΣΙΑΣ



Διαδύμα
ΑΝΑΛΥΤΙΚΩΣ ΚΑΙ ΕΡΕΥΝΗΤΙΚΩΣ

ΕΛΛΗΝΙΚΟ ΑΝΟΙΚΤΟ ΠΑΝΕΠΙΣΤΗΜΙΟ

