

Abstract Book

Workshop

*Present and perspectives in airborne particulate matter pollution in city of Timisoara. Causes and potential hazards to human health and environment.
Policies and strategies on air pollution control and prevention.*

In the frame of research project:

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Reduction of nanoparticle emissions by the optimization of residual combustion gases filtering processes,

PARTICULATE MATTER DISPERSION IN TIMISOARA URBAN AREA

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Abstract

Atmospheric particulate matters (PM) are micro or nanosized solid matter suspended in the Earth's atmosphere. Sources of particulate matter can be man-made or natural and they have impacts on climate, meteorological conditions, and adversely affect human health.

Controlling the man-made atmospheric emissions has become of great scientific interest due to the continuous increase of pollutants released into the atmosphere by almost every human activity, and because fine particles suspended in atmosphere were proved to have a negative impact on human health.

In this line of reasoning, two matters are discussed: the experimentally obtained pollution maps of Timisoara, showing the spatial distribution of the numerical concentration of particulate matter (between 0.3-2.5 μ m and 2.5-5 μ m) over the city area; the simulation of the dispersion of pollutants emitted by Pro Air Clean Ecologic incinerator in Timisoara, based on specific meteorological conditions (air pressure and humidity, the velocity and the direction of the wind). The concentration and the properties of the pollutants detected experimentally at the combustion chimney, the effective height of the chimney and the specific meteorological conditions are taken into account and their influence on the dispersion is discussed.

Keywords: particulate matter, pollutants, concentration.

Acknowledgments

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FROM THEORY TO PRACTICE CONCERNING AIR QUALITY MONITORING

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Abstract

Improving the current knowledge regarding the urban pollution is critical for evaluating the anthropogenic pollutants' influence on regional climates.

The oral presentation will focus on results in connection to air quality in Timisoara, achieved by an accredited laboratory (www.mediu.ro), over the period June - October 2015, in eight locations, demonstrating its competence, in accordance to its documented quality management system. One applied ISO/IEC 17025, meaning the standard for which most labs must hold accreditation in order to be deemed technically competent.

The scope of the on line campaigns was not only to attest the air quality during the related episodes and inform authorities and the population about the level of the measured concentrations in respect to the maximum values, but also to collect data for improving the current knowledge regarding the urban aerosols, which is critical for evaluating the anthropogenic aerosols influence on regional climates.

Thus special concern raised by the identified PM10 concentration values that overcome the maximum admitted limit in certain episodes. Particulate Matter (PM) suspended in the atmosphere can influence the amount of solar radiation that reaches the earth's surface through scattering and absorption processes, causing the heating or cooling of the atmosphere and the influence the radiation energy balance. A second radiative effect from aerosols is related to their ability to modify the optical properties, amount and life time of clouds, which is known as aerosol indirect effect. Not at least one has to mention the high incidence of PM on the health of human beings, especially.

In conclusion, exploring new boundaries of science and technologies and pass their experiences to more creative new generations is a present duty and scope of all researchers.

TUMOR CELLS DEATH INDUCED BY MAGNETITE NANOPARTICLES – *IN VITRO* STUDY

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Abstract

Introduction: During tumorigenesis process, cancer cells proliferate without control, escaping the cellular death regulatory mechanisms. Several types of cell death have been described: apoptosis (type I), autophagy-associated cell death (type II), necrosis or oncosis (type III), mitotic catastrophe, anchorage-dependent mechanisms - anoikis, excitotoxicity, Wallerian degeneration, and cornification of the skin. This study aimed to investigate for the first time a possibly novel mechanism inducing tumor cell death under *in vitro* conditions - enucleation.

Materials and methods: We pursued the influence of colloidal suspensions of Fe₃O₄ nanoparticles on human tumor cell lines (melanoma, breast, hepatic and pancreatic cancer) and non-tumor cells (adult mesenchymal stem cells, MSCs) grown according to standard cell culture protocols. Magnetite nanoparticles (MNPs) were prepared by combustion synthesis, double layer-coated with oleic acid and left to interact with tumor cells for various time intervals (2h, 6h, 12h, 24h, and 48h). The *in vitro* studies focused on morphological and ultrastructural changes, functional studies, immunophenotypical markers and gene expression of tumor and mesenchymal stem cells, employing appropriate methodologies.

Results: Scanning and transmission electron microscopy revealed that tumor cells developed a network of intracytoplasmic stress fibers, which induce extrusion of nuclei, and enucleated cells die. Normal adult mesenchymal stem cells, used as control, did not exhibit the same behavior. Intact nuclei were found in culture supernatant of tumor cells, and were visualized by immunofluorescence.

Conclusion: This study provides evidence that enucleation is a potential mechanism of tumor cell death, opening new horizons in cancer biology research and development of therapeutic agents capable of exploiting this behavior.

Keywords: tumor cells, cancer cell death, cell enucleation, magnetite nanoparticles

METHODS USEFUL IN BIOMONITORING URBAN HABITAT QUALITY

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Abstract

The interactions between different plant species and urban habitat quality were extensively investigated by different researchers. We tested several methods useful in biomonitoring urban habitat quality: the concentrations of airborne pollen, the concentrations of fungal spores in the atmosphere, the viability of pollen, quantification of colonization with vesicular arbuscular mycorrhizae, the density of stomata and density of trichomes, leaf relative water content and leaf ash content, leaf relative saturation deficit and succulence, leaf water loss, specific leaf area and specific leaf weight, leaf thickness and leaf thickness lost, density of foliar tissue, leaf area and fractal dimension of leaves.

This study was carried out according to the volumetric method of sampling, identifying and quantifying of airborne allergens, using a Lanzoni sampler, in the atmosphere of Timisoara. 85 fungal spores in the present study were reported. A total of 23 pollen types were identified of which *Ambrosia artemisiifolia* pollen showed maximum concentration. Identifying and quantifying aeroallergens may contribute to: targeting specific preventive measures; assessing the role played by the allergens in sensitization; directing immediate and future therapeutic plans; directing production of allergenic extracts and vaccines according to the presence of allergens in a certain area; producing pollen and fungal spores calendars which show the dynamics of allergens; the management of parks and green areas. Changes of allergens content of the air should be known early enough to react with changes in diagnosis and treatment, whenever a new allergen is present.

PHYTOSTABILIZATION OF SLAG AND ASH PITS THROUGH COVER CROPS

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Abstract

Slag and ash resulted from the coal burning process in thermal power plants are an important industrial residue. Ash is a fine mass of spherical or irregular compact or porous particles. The particles are separated from flue gas through filters. The separated ash is sent to thermal plant pits that are inert from the agronomic perspective. About 90-99% of the ash particles are smaller than 10 μm in diameter; of these, up to 70% are smaller than 2.5 μm . Ash contains elements under the form of oxides, such as silicon, aluminium, iron, calcium, magnesium etc. Other elements contained in ash are Zn, Pb, Ni, Cd, Cr, Cu, Mn etc. Through hydroclimatic phenomena, ash particles rise in the environment and have a strong negative impact on the flora and fauna and man's health. The cultivation of tolerant plants like *Lolium perene* or legumes like *Onobrychis viciifolia* under the conditions of the ash deposit area stabilizes upper soil layers against erosion, deflation etc. The condition of planting the cover crop is to provide the required amount of nutrients for the plants, which is done through recycling another industrial residue, the stabilized town sludge. Cover crops grow and cover over 75% of the sown area after two years of vegetation.

Keywords Slag and ash, town sludge fertilization, cover crop, ash pit stabilization

RECOVERY OF COPPER FROM WASTE COMPLEX CATALYST USED IN COSORB PLANTS

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Dedicated to the 150th anniversary of the Romanian Academy

Abstract

Responsible management of wastes coming from technological processes is a great priority highlighted by the internal and European legislation [1]. According to EU this means responsible management of chemical wastes by each member state [2,3]. One of the major problems encountered in environmental protection is pollution caused by hazardous heavy metals dispersed in air, soil and water.

In this respect, the used complex catalyst CuAlCl_4 *toluene resulted from the COSORB processes has been the subject of our recent studies in terms of advanced recovery of all chemical species involved for its synthesis, namely: toluene, copper and aluminum. First, the waste catalyst was treated with water, and then the organic phase was separated for the advanced recovery of *toluene* by distillation. The copper source was isolated from the inorganic phase under CuO form, used further to synthesize copper nanoparticles. Monodispersed porous *copper nanocubes* were obtained for the first time in aqueous media at room temperature by chemical reduction method using poly(vinylpyrrolidone) (PVP) as capping agent, sodium tetrahydroborate (NaBH_4) as reducing agent and ascorbic acid as anti-oxidizing agent. The synthesis and characterization of the copper nanocubes by electronic microscopy and X-ray diffraction techniques will be also presented. *Aluminum* was recovered from the inorganic phase as complex flocculation agent for waste water treatment. The toxicological and pollution control of each technological step was assessed in order to control the ecological risk.

References:

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2. Globalisation, the environment and you, EEA, 2011.
3. Impact of Structural Change: Implications for Transition to the Green Economy, GHK, 2011.

**THE EVACUATION OF SLAG AND ASH DENSE SLURRY TECHNOLOGY .
ECONOMICAL AND ECOLOGICAL SOLUTION FOR MANAGEMENT OF SOLID
WASTE FROM POWER PLANTS POWERED BY COAL**

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Abstract

The writing presents the problem of ash and slag deposits from Power Stations functioning with solid fuel. The classic tapping technology of firing resulting ashes and slag, the technical , economical, and environment impact resulting problems generating by this technology and this shortcomings also. Starting from this shortcomings, they are mentioned the concerns in order to remove them.

Keywords Environmental – friendly, stabilizing the slag, ash disposals.

PROBABLE MECHANISMS OF ACID RAIN GENERATION THROUGH NANOPARTICLES

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Abstract

This paper deals with the mechanisms of oxidative degradation of micropollutants in the atmosphere and the sorption-desorption mechanisms that determine the transformation of acid nanoparticles into aerosols and their subsequent coalescence in fine particles that are released in the atmosphere with the precipitations.

Keywords: Micropollutants, nanoparticles, aerosols, sorption-desorption, environment.

P84 BAGHOUSE EFFICIENCY TEST RIG

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Abstract

The filter material has a direct influence on the dust cake formation. Developed during 1984, P84 (PI) proved to be very good for filtration. The P84 fibers are produced in a dry spinning process.

Classic membrane materials do not hold a permanent dust cake, this usually forms a compact dust cake where the gas species have a limited contact with the reagents and the dust particles.

Higher filtration and dry scrubber efficiencies are achieved with a rich and porous dust cake formed by P84 multilobal surface fibers as proved by P84 baghouse efficiency test rig. The Evonik Filtration Test Rig is a valuable tool for the direct evaluation of filter materials, with numerous applications.

Keywords: Filtration, filter materials, dust cake, baghouse efficiency, P84.