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November 12-13, 2018 | Rome, Italy

DAY 1

Scientific Tracks & Abstracts

Day 1

SESSIONS

November 12, 2018

Satellite Remote Sensing and GIS | Space Explorations | Satellite Navigation and Communication | Earth Science | Separation Technique in Chromatography | High Performance Liquid Chromatography

Session Introduction

Session Chair

John M Quinn
Exos Aerospace, USA

Session Chair

Silvestro L
3S-Pharmacol. Cons. & Res. GmbH, Germany

Title: **Monitoring program in reservoirs of the tercero river basin. Córdoba, Argentina**
Maria Claudia Rodriguez, Universidad Nacional de Rio Cuarto, Argentina

Title: **Chemical measurements of NIM on JUICE, ESA mission to jupiter satellites (2028)**
Marek Tulej, University Bern, Switzerland

Title: **Applications of ICP-MS hyphenated to HPLC on biological samples for PK studies**
Silvestro L, 3S-Pharmacol. Cons. & Res. GmbH, Germany

Title: **Liquid-Liquid Partition Chromatograph: An efficient solid support less chromatographic technique for the separation of bioactive phytomolecules**
Anupam Maurya, Ministry of AYUSH, India

Title: **Moon-based planetary defense campaign**
Thomas D Miyano, Draconis Aerospace Limited Liability Company, USA

Title: **Methodologies, approaches and techniques to assist the thermal engineers**
Yannick Melameka, Alphid, UK

Title: **High Performance Liquid Chromatography**
Walter Jones, International Association for Plant Taxonomy, South Africa

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Maria Claudia Rodriguez et al., J Chem Tech App 2018, Volume 2

MONITORING PROGRAM IN RESERVOIRS OF THE TERCERO RIVER BASIN CÓRDOBA, ARGENTINA

Maria Claudia Rodriguez, Bonansea M, Pinotti L, Ledesma C Mancini M and **Reynoso V**
Universidad Nacional de Rio Cuarto , Argentina

Lakes and reservoirs are strategic locations for the environment and the society that are exposed to environmental degradation as result of human activities. Agencies responsible for the management of these resources require the development of new technological tools to extend its scope. The objective of this project is to develop an integral program of comparative monitoring of water quality and trophic state in a system of chained reservoirs in Córdoba, Argentina. Bimonthly water samplings are going to be performed in the multipurpose reservoirs Cerro Pelado, Rio Tercero, Cassaffousth, Reolín, Piedras Moras. Physicochemical and biological variables measure in reservoirs and their tributaries will be statistically analyzed. Water quality and trophic status will be determined by conventional techniques. Preprocessed Landsat ETM+, LDCM, CBERS-4, ASTER and MODIS satellite images will be used to generate geostatistical models to determine and predict spatio-temporal water quality patterns. Maps and generated models will be related to trophic index obtaining a geographic information system (GIS) that will be used to identify and distinguish spatio-temporal changes in trophic state of reservoirs. The developed system could be used by watershed authorities as a new tool for the active management of reservoirs, allowing the development of an early warning system to monitor changes in water quality, reducing critical areas of risk to public/animal health.

BIOGRAPHY

Maria Claudia Rodriguez has completed her PhD in Rio Cuarto University, Argentina and post doctorate in Polytechnic University Madrid Spain. She has published papers, chapters of the books, book. She is a researcher, consultant in water quality management, risk, wastewater treatment.

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Marek Tulej, J Chem Tech App 2018, Volume 2

CHEMICAL MEASUREMENTS OF NIM ON JUICE, ESA MISSION TO JUPITER SATELLITES (2028)

Marek Tulej
University Bern, Switzerland

Statement of the Problem: JUICE, the L-class mission of ESA to explore the Jupiter system will deliver chemical measurements of the Jupiter satellites exospheres, the icy moons Europa, Ganymede and Callisto. One of the instruments in the PEP consortium employed on the mission will the neutral gas mass spectrometer as part of the particle consortium (PEP). We develop prototypes of the instrument to test against the physical and environmental conditions expected in the Jupiter environment, and measurements near these moons. The exospheres of the icy moons are populated by material originating directly from the moons' surfaces, thus NIM measurements can be inverted to derive the chemical composition of the surface. By studying the composition of all three icy moons we will also get crucial information on the evolution of these objects with time, since they started from the same chemical inventory. We started unique laboratory experiments simulating the icy surfaces of these moons and their response to particle radiation in forming their exospheres; in parallel we develop necessary shielding against the high energy radiation to protect the instruments and theoretical models of the atmospheres of these moons, both in preparation of the science phase of this mission.

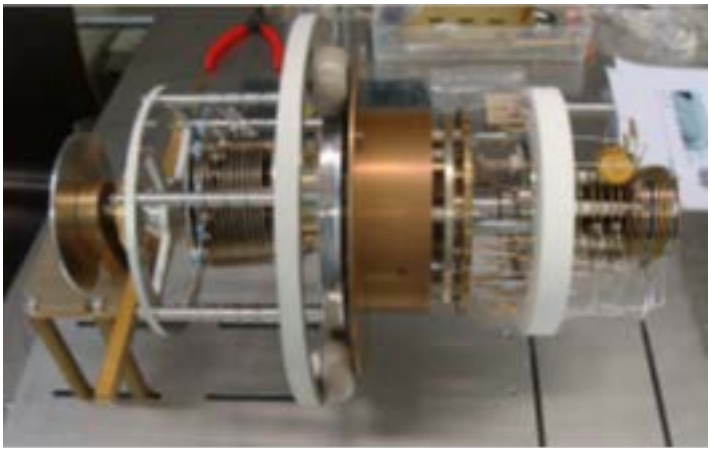

Fig.1. NIM prototype mounted in fixture for installation in the STROFIO chamber for the CASYMIR neutral beam facility. The ion source is on the right side, the ion mirror on the left, and the detector is the top-most part on the white structure.

BIOGRAPHY

Marek Tulej has completed his PhD from Basel University, Switzerland. Currently, he is the staff member of planetary sciences and space research division and head of Laser mass spectrometry lab in Physics Institute Bern. He is involved in the development of a miniature analytical instruments for space missions. Currently, He is a Science Group Member for the missions to The Moon (Luna Glob, Luna Resurs) and Jupiter satellites(JUICE). Marek has published more than 80 papers in reputed journals and have been serving as an editorial board member, journal and proposal reviewer.

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Silvestro L et al., J Chem Tech App 2018, Volume 2

APPLICATIONS OF ICP-MS HYPHENATED TO HPLC ON BIOLOGICAL SAMPLES FOR PK STUDIES

Silvestro L, Maurer M, Ochinzi E and **Rizea Savu S**
3S-Pharmacol. Cons. & Res. GmbH, Germany

ICP-MS is a well-established analytical technique mainly applied to metal determinations both in inorganic chemistry and biological samples (environmental and toxicological studies). The possibility of ICP-MS hyphenation to separation techniques, like HPLC and CZE, has shown interesting results in particular for the speciation of inorganic ions while applications in biological samples for pharmacological studies are rare. Along the years several pharmaceutical products containing metal, like iron, in high molecular weight complexes have been developed presenting difficult analytical problems especially in biological samples; indeed the determination of the metal itself is of modest values without concomitant information like molecular weight and polarity. In this context the combination with HPLC, permitting separations based on molecular weight, ionic strength and hydrophobicity, is an ideal tool to develop selective methods for such complex compounds. The possibility to correctly quantitate an element, irrespective of the chemical structure where is contained, is another interesting feature of ICP-MS and it offers interesting possibilities of metabolites quantitation and identification in biological samples of drugs containing not just metals but also sulfur and/or phosphor. A series of applications centered on these two classes of compounds will be presented showing the great potential of ICP-MS as a detector in combination with HPLC; as always nothing is perfect and therefore the limitations of this analytical approach will be discussed, in particular matrix effects and mobile phase compatibility.

BIOGRAPHY

Silvestro L graduated in Medicine in Turin (Italy) in 1984 and specialized in Pharmacology in 1988. From 1989 he is applying HPLC-MS in quantitation of bioanalytical samples as well as identification of drug metabolites. In 1990 he began to study the application of ICP-MS and other elemental analysis methods, hyphenated to HPLC, on bioanalytical samples. In 1996 he has co-founded 3S-Pharmacological Consultation & Research GmbH, a consultation company and CRO, in Germany and is still actively involved in the development of innovative analytical methods. From 1998 the company has expanded the activity in East Europe (Romania, Moldavia) creating an analytical laboratory in Romania (Bucharest). In his scientific activity he has contributed to more then 60 articles in international scientific journals.

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Anupam Maurya et al., J Chem Tech App 2018, Volume 2

LIQUID-LIQUID PARTITION CHROMATOGRAPH: AN EFFICIENT SOLID SUPPORT LESS CHROMATOGRAPHIC TECHNIQUE FOR THE SEPARATION OF BIOACTIVE PHYTOMOLECULES

Anupam Maurya, Subash Chandra Verma and **Ravinder Singh**
Ministry of AYUSH, India

Phytomolecules are secondary metabolites of plants origin which have various biological activities and became key source for the discovery of new drugs. Last 20 years, almost 50% drugs directly or indirectly derived from natural products for Human welfare. All phytomolecules, often exit as a very complex mixture from which the product of interest must be isolated and purified, separation of these molecules from the plants is very tedious and time taking. At present, the used adsorbents SiO2 and Al2O3 are not chemical inert. Separation of natural products on alumina or silica gel sometimes results in recovery of only 70-90%. Sometimes severe losses of valuable materials result because of irreversible adsorption on a solid support. In addition, isolation of artifacts has also been reported due to chemical reaction of the substrates with solid phase adsorbents. Introduction of Liquid- Liquid Partition Chromatography (CCC, CPC etc.) provided new dimension in area of separation, isolation and purification of phytomolecules, in which both stationary and mobile phase are liquid. The separation of Compounds in this technique is based on their Partition Coefficient (K), in which the compounds distribute between biphasic solvent systems. Techniques having number of advantages when it compared with the more traditional liquid-solid separations method: (i) It can be used in both normal and reverse phase; (ii) It is less time taking & economic; (iii) No irreversible adsorption (iv) Recovery more than 90%.; (v) Tailing minimized; (vi) Low risk of sample denaturation; (vii) Low solvent consumption & High loading capacity. With these above said advantages, techniques are gaining popularity as modern separation technique.

We have also successfully applied Fast Centrifugal Partition Chromatography (FCPC) for the separation and isolation of various phytomolecules like iridoids, nitrile glycosides, triterpenoids, alkaloids and steroidal glycosides & glycoalkaloids. The detail procedures of this method will be disused in WCCSS 2018.

Note:

BIOGRAPHY

Anupam Maurya has completed his PhD at the age of 31 from CSIR-CIMAP India. Currently, he is working as a Scientist (Scientific Officer) at Pharmacopoeia Commission for Indian Medicine and Homoeopathy, India. He has published more than 24 papers in reputed journals and granted one US patent. His current citation of publication is 238 and H-index is 10. He has carried substantial work on the isolation of Phytomolecules by Partition Chromatographic Technique and development of analytical methods for Indian Medicinal Plants.

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Thomas Drake Miyano, J Chem Tech App 2018, Volume 2

MOON-BASED PLANETARY DEFENSE CAMPAIGN

Thomas Drake Miyano
Draconis Aerospace Limited Liability Company, USA

The Moon is an ideal location to launch intercepting missions to life-threatening and catastrophic asteroids. The effectiveness of the interception greatly depends on the weight of the spacecraft. Unfortunately, interceptors launched from the Earth lose more than 98% of their weight by burning the majority of their onboard fuel and by jettisoning their lower stage structures before entering a heliocentric orbit. However, if interceptors are launched from the Moon by a lunar surface accelerator, they can enter a heliocentric orbit without consuming any onboard fuel or jettisoning any part of the spacecraft. A 5-ton construction package, which consists of robots and industrial production equipment, would enable mining on the moon and construction of a 3.5 km-long, 5,000-ton accelerator.

Large asteroid impacts have and will inevitably occur, and it is important to be prepared to avoid catastrophes, but they may not happen immediately or even within the next fifty years. The future planetary defense system must be a dual-use system, which continuously provides a secondary benefit to justify its operation and maintenance costs. When it is not defending the planet, the Lunar Electromagnetic Interceptor Launch System (LEILAS) can send over a thousand tons of construction material and fuel annually to the Low Earth Orbit (LEO) or Earth-Moon Lagrange Point Two (EML-2) to build space stations and to construct large spacecraft for deep space missions. The paper has been published via Journal of Space Safety Engineering and available via https://www.sciencedirect.com/science/article/pii/S2468896717300617.

BIOGRAPHY

Thomas Drake Miyano has completed his Masters of Aerospace Engineering Degree from the Ohio State University, USA, and received additional education In space systems operation from the Naval Postgraduate School. He is the officer in charge of CFWP Det AIMD Iwakuni, commands 140 personnel and direct intermediate Level aerospace maintenance for Carrier Air Wing Five. He is a member of the department of Defense's acquisition professional community and certified in the field engineering, manufacturing, contracting and program management.

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Yannick Melameka, J Chem Tech App 2018, Volume 2

METHODOLOGIES, APPROACHES AND TECHNIQUES TO ASSIST THE THERMAL ENGINEERS

Yannick Melameka
Alphid, UK

The space industry is changing dramatically. Those changes are mainly driven by the pressure to significantly reduce the cost. CubeSat technology perfectly effects these changes. CubeSat technology enables easy access to space. Therefore, more people will gain access to the internet. I believe that education is the most powerful tool in the world. Tomorrow, if you provide access to skills and knowledge to anyone in the world, you give the potential to anyone to create or innovate and thus improve our lifestyle. Spacecraft has the power to do so and I want to be part of this by bringing my contribution. By helping to standardize the thermal analyses across the world, I will share my skills and knowledge with the thermal engineers. It is my hope that people will comment, ask questions, or innovate, which will bring additional value to the thermal engineers' community and the space industry.

BIOGRAPHY

Yannick Melameka has completed his master's degree in mechanics and at the age of 24 years from Polytech'Marseille Graduate School of Engineering (IUSTI), France. He is a senior thermal engineer with 6 years' experience in thermal analysis, thermal tests and equipments and satellites 3D modelling for the space industry. Yannick's career started when he joined Thales Alenia Space in Toulouse, France as Thermal Engineer. There he tested software tools dedicated for the thermal analysis of circuit electronic board. 6 months later, he moved to Cannes, France as spacecraft thermal engineer for Thales Alenia Space with Altran. He was in charge of thermal analyses of SatcomBw2 spacecraft from the predictions of satellite tests temperatures to the predictions of satellite flight final temperatures. After 3 years in Cannes, he moved to Leicester, United Kingdom as senior thermal engineer for ITP aero which is designing ESATAN-TMS. He combined both his expertise on spacecraft thermal engineering and ESATAN-TMS to provide thermal engineering technical services, answer user enquiries regarding the thermal analysis products, offer advice on the use of products and deliver training material. Yannick is now heading up Alphid, a consultancy company he started in 2013.

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Walter Jones, J Chem Tech App 2018, Volume 2

HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

Walter Jones
International Association for Plant Taxonomy (IAPT), South Africa

Liquid Chromatography and electrophoresis played a major role in the life science revolution, most strikingly in problem purification, peptide fractionation and sequencing, amino acid analysis, and DNA sequencing. The objective of this paper is to examine the potential role of separation systems in the continuing evolution of biochemistry and molecular biology, very small chip-based system may change how chemical analyst in biology, medical research and health care evolve over the next decade.

BIOGRAPHY

Walter Jones studied Diploma in Military Medicine at the University of Moscow-Russia, continued at the University of Cambridge for bachelor of science in medical chemistry & biology (on "physiological, morphological and Yield Characteristics of the winged bean, psophocarpus tetragonolobus), he did his master of science in computer science at the university of the Witwatersrand in Johannesburg from 1987 to 1991. 1993 doctorate from the University of the Witwatersrand completed his PhD in Computer Science Thesis: Communication Concurrency. He became a Head Department of Biodiversity Informatics and Laboratories in 1998; He became Director and Professor in 2000, Head, Department of Research and Biodiversity Informatics in 2012, Computer Science, Computational Chemistry at the Universities of Vista (now University of Johannesburg) and the University of the Witwatersrand. He enrolled with Harvard University – Boston from the United States of America Completed Doctor of Medicine in Nuclear Medicine - MD. He further enrolled with the University of Johannesburg for extra-curricular and completed the course for One year Community Leadership before enrolling for Post-Doctoral- DSC in Energy Technology) from Anhalt University in German. He joined the Ministry of Energy as Special Adviser to the Minister of Energy. He's currently a Senior Lecturer and Supervisor at the Universities of Johannesburg and Durban University of Technology and he's Advisor Member of the Editorial Postgraduate Publications on Green Economy Development DUT respectfully.

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DAY 2

Scientific Tracks & Abstracts

Day 2

SESSIONS

November 13, 2018

Market Growth of Chromatography | Advances in Chromatography | Satellite Radiance | Space Environment and its Interaction with Spacecraft | Military Satellites

Session Introduction

Session Chair

John M Quinn
Exos Aerospace, USA

Session Chair

Silvestro L
3S-Pharmacol. Cons. & Res. GmbH, Germany

Title: **Chromatography and separation science in integrated environment code for sustainable development**

Davidson E Egirani, Enopmc services ltd, UK

Title: **Development and identification of a full-detailed friction model of reaction wheel**

Milad Azimi, Aerospace Research Institute, Iran

Title: **Structural analysis of a finite element model of 3U cubesat for low earth orbit exploration**

Milad Azimi, Aerospace Research Institute, Iran

Title: **Development of HPLC method for simultaneous determination of four steroid hormones in different matrices**

Areeg Z Alkarali, Misr International University, Egypt

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Davidson E Egirani, J Chem Tech App 2018, Volume 2

CHROMATOGRAPHY AND SEPARATION SCIENCE IN INTEGRATED ENVIRONMENT CODE FOR SUSTAINABLE DEVELOPMENT

Davidson E Egirani
Enopmc services ltd, UK

Communities recognize that the steadily increasing level of economic activities and population growth, lead to an increase in environmental pressure on critical areas. These adversely impact on the aquatic and terrestrial environment of the population and fragile ecosystems. Therefore, there is need for stakeholders to critically appraise principles, policies and practices that could lead to sustainable environment that is driven by chromatography and separation science principles and practices. This is applicable in management of active environmental resources that are contaminant free. This is for enhancing social, economic and environmental resource performance. Management of watershed, industrial systems, agricultural systems and biodiversity could fail, in the absence of integrated improved separation and chromatography techniques to environmental management. Therefore, sustainable organs need to handle legal instruments in a sustainable manner to encourage and support integrated programs of industrial and agricultural communities. The significant focus areas of sustainable agricultural development, industrial development, and management of the natural resources have suffered setback. These setbacks are due to the limited understanding of the role of chromatography and separation science principles and practices. There is minimal catalysis and chemical engineering-based management system in developed and developing countries. In planning and attempting to manage man and the resources under his control, the ability to subdue waste using chromatography and separation science approach is critical to stakeholders and should continuously form a component of the management review and plan. This is because, waste inclusive agricultural and industrial waste knows no boundary. This poses the most challenging aspect of prosperity offered by the quality, quantity, diversity and sustainability of our environmental resources. Therefore, this paper would discuss the content of an integrated environment code anchored on a sustainable chromatography and separation science planning cycle. This approach could drive and sustain the harmony between man and the environment.

BIOGRAPHY

Davidson E Egirani has completed his PhD in environmental science at the University of East Anglia, United Kingdom, now he is an Academic of Environmental and Applied Geology, head of EAAWRE research on the aquatic environment. He has done his B.Sc., M.Sc. in the field of Earth Sciences at Ibadan. He got Thomas Edison Award-2014 in Energy and Environmental Science for Inspiration and knowledge distribution among young research scholars. Currently his researches focus on the effect of anthropogenic activities on aquatic environment, with special emphasis on the reduction of toxic metals in agricultural and industrial systems using mineral adsorbents. He has published over 70 articles that have been cited over 69 times. As a Lead Consultant, he got practical experiences in providing expert advice on the effect of mine water chemistry on agricultural land, cutting across Asia, Africa and the United Kingdom. Dr Davidson Egirani is a Visiting Lecturer to International Universities. He is a member of several international professional organizations inclusive, International Medical Geology Association and Council for Nutritional and Environmental Medicine.

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Note:

Milad Azimi et al., J Chem Tech App 2018, Volume 2

STRUCTURAL ANALYSIS OF A FINITE ELEMENT MODEL OF 3U CUBESAT FOR LOW EARTH ORBIT EXPLORATION

Milad Azimi, Alireza Alikhani and **Alireza Mahmoudian**
Aerospace Research Institute (Ministry of Science, Research and Technology), Iran

The predicting of the structural responses of modern spacecraft subsystems with compact configuration is a complicated and interdisciplinary problem. So, the structural analysis of dynamic systems is of great interest to determine the natural frequencies, the stress induced, the deformation during the system operational life to at the corresponding mode of vibration, and to ensure that the overall coupling frequency is well out of the prohibited zone. This paper deals with the structural design of a modular 3U CubeSat for the Low Earth Orbit exploration. A unified finite element model was used in all associated structural analyses. All subsystems were modeled as remote masses at their center of gravity positions, considering their moments of inertia. The worst-case harmonic, buckling, shock and random vibration along with modal analyses have been performed on the CubeSat platform in order to ensure that the satellite could withstand the various loading conditions from the Iranian Space Research Institute experimental data during the launch.

BIOGRAPHY

Milad Azimi is currently a faculty member in the Aerospace Research Institute (Ministry of Science, Research and Technology) and part of the system architecture team for a CubeSat satellite program with more than 10 years' experience in mechanical and aerospace engineering. He has extensive experience in various aspects of spacecraft design and systems engineering. Successful contribution in quality management, project management, product-development life cycle methodologies. Dr. Azimi specializes in spacecraft and subsystem design, system analysis and modeling. His research interests are dynamics and control of space vehicles, robust control, nonlinear systems, smart structure and materials, vibration control, micro/nano satellite design and structural dynamics and experimental dynamics.

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DEVELOPMENT AND IDENTIFICATION OF A FULL-DETAILED FRICTION MODEL OF REACTION WHEEL

Milad Azimi, Ghasem Sharifi and **Alireza Alikhan**
Aerospace Research Institute (Ministry of Science, Research and Technology), Iran

The ever-increasing use of satellites demands a search for increasingly accurate and reliable pointing systems. Reaction Wheels are rotating devices used commonly for the attitude control of the spacecraft since provide a wide range of torque magnitude and high reliability. The numerical modeling of this device can significantly enhance the accuracy of the satellite control in space. Modeling the wheel rotation in the presence of the various frictions is one of the critical parts of this approach. This paper presents a Dynamic Model Control of a Reaction Wheel (DMCR) in the current control mode. In current-mode the required current is delivered to the coils in order to achieve the desired torque. During this research, all the friction parameters as viscous and coulomb, motor coefficient, resistance and voltage constant are identified. In order to model identification of a reaction wheel, numerous varying current commands apply on the particular wheel to verify the estimated model. All the parameters of DMCR are identified by Batch Gradient Descent (BGD) optimization method. The experimental results demonstrate that the developed model has an appropriate precise and can be used in the satellite control simulation.

BIOGRAPHY

Milad Azimi is currently a faculty member in the Aerospace Research Institute (Ministry of Science, Research and Technology) and part of the system architecture team for a CubeSat satellite program with more than 10 years' experience in mechanical and aerospace engineering. He has extensive experience in various aspects of spacecraft design and systems engineering. Successful contribution in quality management, project management, product-development life cycle methodologies. Dr. Azimi specializes in spacecraft and subsystem design, system analysis and modeling. His research interests are dynamics and control of space vehicles, robust control, nonlinear systems, smart structure and materials, vibration control, micro/nano satellite design and structural dynamics and experimental dynamics.

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DEVELOPMENT OF HPLC METHOD FOR SIMULTANEOUS DETERMINATION OF FOUR STEROID HORMONES IN DIFFERENT MATRICES

Areeg Z Alkarali, Lubna Kormod, Randa A Abdelsalam Ghada M Hadad and **Ahmed E El-Gendy**
Misr International University, Egypt

Since animal products are a major source of human exposure to steroids. The extensive use of these hormones resulted in a critical request for accurate, sensitive, simple and applicable methods for the determination of these steroid hormones in pure form and in different matrices as hen eggs, chicken liver and Tilapia farming pond water. The aim of this work is to develop a reliable liquid chromatography coupled with mass spectrometric method for the determination of selected steroid hormones in complicated matrices as hen egg, chicken liver and Tilapia farming pond water. Using solid phase and liquid liquid extraction as methods of sample preparation. In the present study LCMS/MS method was demonstrated for the simultaneous separation and quantification of 4 steroid hormones Ethinlyestradiol, 17 alpha Methyl testosterone, testosterone, and progesterone. Using mobile phase of methanol and 0.1% Formic in ratio (70:30) at different m/z ratios. The method validation was carried out on each hormone showing: linearity for Ethinylestradiol 0.5 µg/ml to 30 µg/ml r2=0.9997, 17α-methyl testosterone 0.5 µg/ml – 20 µg/ml r2=0.9999, Testosterone 0.5 µg/ml - 20 µg/ml r2=0.9999 and progesterone 0.5 µg/ml- 20 µg/ml r2=0.9999. LOD and LOQ of (0.7 and 2.12), (0.23 and 0.69),(0.35 and 1.08). and (0.36 and 1.11) for Ethinylestradiol, 17 α methyl testosterone, testosterone and progesterone respectively. The method was validated using the ICH guidelines and successfully applied on egg, chicken liver and Tilapia pond freshwater samples from Egypt.

BIOGRAPHY

Areeg Z Alkarali has completed her bachelor's degree in pharmaceutical sciences in 2012 from Misr International University; after that she finished her master's degree in pharmaceutical analytical chemistry in 2018 from Suez Canal University.

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