

3<sup>rd</sup> International Conference on

# MASS SPECTROMETRY, PROTEOMICS AND POLYMER CHEMISTRY

May 20-21, 2019 | Rome, Italy

MASS SPECTROMETRY CONGRESS 2019



## KEYNOTE FORUM DAY 1

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Magnus S Magnusson, J Chem Tech App 2019, Volume 3



## Magnus S Magnusson

University of Iceland, Iceland

### BIOGRAPHY

Magnus S Magnusson completed his PhD at University of Copenhagen in 1983. He is a Research Professor, Founder and Director of the Human Behavior Laboratory, University of Iceland. He is the author of the T-pattern model and detection software THEMETM, focused on real-time organization of behavior. He was co-directed a two-year DNA analysis project and presented numerous papers and talks in ethology, neuroscience, mathematics, religion, proteomics, mass spectrometry and nanoscience. He was Deputy Director at Museum of Mankind during 1983 to 1988, National Museum of Natural History, Paris. He is a repeated invited Professor at the University of Paris (V, VIII and XIII). Since 1995, he focused on collaboration between 40 universities based on "Magnusson's Analytical Model" initiated at the Sorbonne, Paris.

[msm@hi.is](mailto:msm@hi.is)

### T-PATTERNS, T-STRINGS AND SELF-SIMILARITY FROM THE RNA WORLD TO HUMAN MASS-SOCIETIES AND CULTURE: A BIOMATHEMATICAL CONTINUUM?

This research study concerns outcomes of a longstanding primarily ethological (i.e. biology of behavior) project beginning in the early 1970's concerning social interaction and organization in social insects and primates including humans and inspired mainly by the work of K. Lorenz, K. von Frisch and N. Tinbergen for which they shared a Nobel Prize in Medicine or Physiology in 1973. The smallest animals they studied were social insects with no implication of nano scale actors or self-similarity. The present project has focused on developing pattern definitions and corresponding detection tools resulting in the T-pattern, a self-similar fractal-like pattern recurring with statistically significant translation symmetry, and corresponding detection algorithms implemented in the dedicated THEMETM software. This has allowed abundant detection of T-patterns in human, animal and neuronal interactions bringing to light T-patterned temporal self-similarity across more than nine orders of magnitude in interaction between and within brains and spatial between T-patterned strings (called T-strings), notably, DNA and texts. The RNA world invented its evolving external memory as the purely informational T-patterned DNA strings and now there is only a DNA world. Similarly, humans created their evolving external memory as the purely informational T-strings of written language and thus in a biological eye blink made possible the development of modern science and technology and now the only big-brain mass-societies are text based. Only mass-societies in proteins and human rely on such voluminous durable "stringomes" external to their citizens where various sub-sets are massively copied, distributed, interpreted, promoted and even enforced for the creation of specialized citizens, tools and materials. Extensive temporal and spatial self-similar patterning thus exist from nano to human scales all patterned in a way reflecting the ancient structure of their nano scale predecessors, an unbroken biomathematical continuum from the RNA world to modern human societies and culture.

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Yuichi Negishi, J Chem Tech App 2019, Volume 3



## Yuichi Negishi

Tokyo University of Science, Japan

### BIOGRAPHY

Yuichi Negishi received his PhD Degree from Keio University, Japan in 2001. He is the Professor of Tokyo University of Science, Japan. He has over 150 publications that have been cited over 8,000 times. In his publications, 10 papers were categorized to Top 1% cited papers and 18 papers were selected as cover picture of the journal. His publication H-index is 45. He has been awarded several prizes, including the PCCP Prize in 2007, CSJ Award for Young Chemists in 2008, Japan Society of Molecular Science Award for Young Chemists in 2012 and Yagami Prize in 2017.

[negishi@rs.kagu.tus.ac.jp](mailto:negishi@rs.kagu.tus.ac.jp)

### HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY MASS SPECTROMETRY IN THE STUDY OF SMALL METAL CLUSTERS

Small metal clusters have attracted considerable attention as new functional nanomaterials because they have size-specific properties and functions that are not found for corresponding bulk metal. In particular, hydrophilic thiolate-protected gold clusters (hereinafter referred to as hydrophilic gold clusters) exhibit high biocompatibility and luminescence quantum yield in addition to pollution-free properties. Therefore, hydrophilic gold clusters are expected to be used in biomedical and environmental applications. Replacing some of the Au atoms in these clusters with different elements may impart them with even more useful functions. However, the synthesis of hydrophilic metal clusters has been less studied because of the complexity involved in evaluating the mass distributions of product mixtures. In this work, we found two hydrophilic interaction liquid chromatography (HILIC) columns for high-performance liquid chromatography (HPLC) suitable for the high-resolution separation of hydrophilic metal clusters. The mass distributions of the product mixtures of hydrophilic metal clusters were evaluated via HPLC mass spectrometry (LC/MS) using these HILIC columns. Consequently, we observed multiple clusters that had not been previously reported for glutathionate (SG)-protected gold clusters (AuN(SG)<sub>M</sub>). Additionally, author demonstrated that Au<sub>n</sub>-xM<sub>x</sub>(SG)<sub>M</sub> alloy clusters (M = Ag, Cu or Pd) in which part of the Au in the AuN(SG)<sub>M</sub> cluster is replaced by a heteroelement can be synthesized, similar to the case of hydrophobic alloy clusters. It is easy to evaluate the mass distributions of hydrophilic metal clusters using this method. Thus, remarkable progress in the synthesis techniques of hydrophilic metal clusters through the use of this method is anticipated, as the situation for hydrophobic metal clusters.

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## Anupam Chanda

Indian Institute of Packaging, India

## BIOGRAPHY

Anupam Chanda has his expertise in creating innovative design in packaging material and device for Biologics, bio similar, anti-Cancer and HIV products. He is having two decades (approx. 25 years) of experience in India and abroad. He is a renowned speaker, widely travel throughout the world. He gain and share his thoughts with scientist from various institution and industry professionals. Author's Technical book "PACKAGING TECHNOLOGY AN ADVANCE PRACTICAL APPROACH" published from Germany and Amazon is distributing among 77 countries. He is attached with various charitable institutions and research institutes.

[mr.anupamchanda@rediffmail.com](mailto:mr.anupamchanda@rediffmail.com)

## PACKAGING CHALLENGE FOR BIOSIMILAR PRODUCTS

Now-a-days Packaging plays a significant role for biosimilar product. The process of selecting materials and the type of packaging also offers an opportunity for the Packaging scientist to look for new biological delivery choices. Most injectable protein products were supplied in some sort of glass vial, prefilled syringe, and cartridge. Those products having high pH content there is a chance of "delamination" from inner surface of glass vial. With protein-based drugs, the biggest issue is the effect of packaging derivatives on the protein's three-dimensional and surface structure. These are any effects that relate to denaturation or aggregation of the protein due to oxidation or interactions from contaminants or impurities in the preparation. The potential for these effects needs to be carefully considered in choosing the container and the container closure system to avoid putting patients in jeopardy. Causes of Delamination: Formulations with a high pH include phosphate and citrate buffers increase the risk of glass delamination; high alkali content in glass could accelerate erosion; high temperature during the vial-forming process increases the risk of glass delamination; terminal sterilization (irradiated at 20-40 kGy for 150 min) is also a risk factor for specific products (veterinary parenteral administration), could cause delamination; high product-storage temperatures and long exposure times can increase the rate and severity of glass delamination; how to prevent delamination; treating the surface of the glass vials with materials, such as ammonium sulphate or siliconization can reduce the rate of glass erosion; consider alternative sterilization methods only in rare cases; the correct specification for the

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glass to ensure its suitability for the pH of the product; use COC/COP vial. Present market demand is syringe barrel and/or plunger coated with silicone. Non-uniform silicone coatings can affect protein stability. The proteins can absorb into the walls of the container. While silicone can reduce absorption, excess silicone can form suspended oil-like droplets. Proteins can form around those droplets and change their natural state. New lubricant coatings, such as inert fluoropolymers, are being introduced to replace silicone. As a very inert material, fluoropolymer provides smoothness for the syringe plunger without the irregularities or the issues that have come with silicone. Other new coating materials are being introduced with new types of packaging related to self-injectors, especially injector pens, patches, transdermal and wearable devices for self-infusion. Extractable and leachable are most important for inhalers and catheters. For an extractables from a device component the AET ( $\mu\text{g/g}$ ) can be determined using Equation 1:

$$AET = \frac{SCT \cdot D_d}{D_d m}$$

Where

Dd- Doses per day

Dt- Total Labelled doses

m- Mass of component

The AET ( $\mu\text{g/device}$ ) for a drug delivery device (e.g. an MDI) can be determined from Equation 2:

$$AET = \frac{SCT \cdot D_d}{D_d}$$

Where

Dd- Doses per day

Dt- Total Labelled doses

## Recent Publications

1. Anupam Chanda (2019) Packaging Challenge for Lyophilized Products. Acta Scientific Pharmaceutical Sciences 3.4: 87-91
2. Anupam Chanda (2018) Packaging Challenge for Biosimilar products. J Bioanal Biomed 10: 82



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J Keith Burdette, J Chem Tech App 2019, Volume 3



## J Keith Burdette

Polymer Alliance Zone Inc., USA

## BIOGRAPHY

J Keith Burdette is the President and CEO of the Polymer Alliance Zone Inc. in West Virginia, USA. The Zone's mission is to assist in the retention and expansion of existing polymer companies as well as work to recruit new investment and jobs in the industry to a region along the Ohio River and area with a large concentration of existing specialty polymer companies. He has most recently served as the Secretary of Commerce and Executive Director of the West Virginia Development Office during the administration of Governor Earl Ray Tomblin. He has served in the administration of two Governors; served in both houses of the West Virginia State Legislature and served five years as the President of the West Virginia State Senate, making him first in line of succession to the Governor. He has also been involved with Shale Crescent USA and the Tri-State Shale conference.

[keith.burdette@pazwv.org](mailto:keith.burdette@pazwv.org)

## THE SHALE REVOLUTION IN THE UNITED STATES AND HOW IT IS AFFECTING THE PETROCHEMICAL AND POLYMER INDUSTRY

The "Shale Revolution" in the United States in general and the northeast states of West Virginia, Ohio and Pennsylvania, specifically has created a massive low cost source for natural gas and natural gas liquids (NGLs). If the three states were a country they would be the 3<sup>rd</sup> largest producer of natural gas in the world and one of the top producers of NGLs. Over 80% of the increase in current production of natural gas in the US is coming from the three-state region. It is estimated that 40% of all gas production in the United States will come from this region by 2040. The growth in NGLs like ethane, butane and propane is equally dramatic. Coupled with the proximity to polyethylene and polypropylene users a major industry consulting firm has released studies showing that this region is now a lower cost alternative for polymer production to the US's Gulf Coast. This region is one of, if not the only place, in the world where extraction of feedstock, processing, manufacturing and ultimate sale of product can all be accomplished in the same area, within an eight hour truck driving shift. This new dynamic is creating new opportunities for the industry which only a decade ago was struggling to develop strategies to import raw materials or off-shore production. Regardless of whether your company is in this region, experts now say that the cost impact within the industry is real and must be considered.

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Elisa Robotti, J Chem Tech App 2019, Volume 3



## Elisa Robotti

University of Piemonte Orientale, Italy

### BIOGRAPHY

Elisa Robotti gained her PhD in Chemical Sciences in 2005 at the University of Piemonte Orientale, Italy with the thesis on chemometric tools applied to the field of analytical chemistry. She won the Young Researcher Prize of the Division of Analytical Chemistry of the Italian Chemical Society in 2005. Currently she is Associate Professor of Analytical Chemistry and Chemometrics at the same University. Her research interests involve in the development and optimization of analytical methods (HPLC-MS/MS, GC-MS and ICP-MS), the development and application of multivariate strategies for the identification of biomarkers in health science (proteomics, metabolomics, lipidomics and genomics); food and environmental sciences, experimental design techniques which was also applied to the industrial optimization of products and processes. She is the co-author of more than 80 papers in national and international magazines (h-index Scopus: 23) and 11 book chapters. She is the editor of a volume on the analysis of 2D-PAGE maps. She was participated in several national and international congresses and also she is responsible for the research units in national and international projects.

[elisa.robotti@uniupo.it](mailto:elisa.robotti@uniupo.it)

### MULTIVARIATE STATISTICAL TOOLS FOR THE IDENTIFICATION OF BIOMARKERS: APPLICATION TO MASS SPECTROMETRY-BASED APPROACHES

Mass spectrometry based techniques, either coupled or not to a chromatographic separation, are high throughput methods providing a huge amount of information. These techniques are often exploited for the identification of markers of particular effects, e.g. comparing different groups of samples in health sciences applications (controls vs pathological, control vs drug-treated etc.) or in food science (samples stored in different conditions, exposed to different environmental effects, from different varieties/cultivars/geographical origins in authentication and traceability studies). The identification of biomarkers from complex data like these must be accomplished by multivariate statistical tools, able to take into consideration the relationships between the variables (protein counts, analyte signals or concentrations, m/z signals etc.), to identify pools of markers with the best predictive ability. To this purpose, pattern recognition methods (Principal Component Analysis etc.) and classification tools like PLS-DA, Linear Discriminant Analysis, SIMCA, Ranking-PCA are also coupled to variable selection methods, Support vector machines etc. can be successfully applied, with a particular attention towards two different aspects: The exhaustivity of the search for biomarkers, to identify all possible candidates providing exhaustive information that can be used to identify deranged pathways; the predictive ability of the models to identify pools of biomarkers that can be used as reliable diagnostic markers. Examples will be provided from different applications: health science, for the identification of biomarkers of disease or of drug treatment; food science, for the identification of markers of different storage conditions, of ripening effects, of geographical origin or variety in authentication studies. The examples will involve applications from LC-MS/MS, GC-MS and ICP-MS. Some hints will also be given on data fusion approaches and able to fuse together different sources of information.

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## KEYNOTE FORUM DAY 2

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G A Farzi, J Chem Tech App 2019, Volume 3



## G A Farzi

Hakim Sabzevari University, Iran

## BIOGRAPHY

G A Farzi is a Professor of Polymer Engineering at Faculty of Engineering in Hakim Sabzevari University, Iran, where he is teaching Polymer Engineering and Polymer Composite Materials for students in PhD and Master of Science level. He obtained his PhD from University of Lyon (INSA DE LYON), France in 2007, and then he finalized a Post-Doctoral Fellowship in University of Lyon. He moved to Iran where he becomes an Assistant Professor at University of Tehran, however soon he moved to his hometown Sabzevar and started teaching and research in closed collaboration with French universities. His area of research interests mainly in Synthesis of polymer via miniemulsion polymerization; encapsulation of organic and inorganic nanoparticles via miniemulsion polymerization technique; development of new technique for the synthesis of hybrid nanoparticles; property study and application of polymer hybrid nanomaterials.

[alifarzi@yahoo.com](mailto:alifarzi@yahoo.com)

## RECENT PROGRESS IN MORPHOLOGY CONTROL OF POLYMERIC HYBRID NANOPARTICLES VIA ONE POT SYNTHESIS

Typical techniques for the synthesis of polymeric hybrid core-shell nanoparticles (such as silica/polymer hybrid nanoparticles) mostly consist based on a two-step process. These processes comprise the preparation of core and shell via separate steps. The main disadvantages of such a process are time consumption, low energy efficiency and relatively non-uniform distribution of organic component, which result in low inorganic loading. However, in recent years author developed one-pot synthesis for different type of polymer hybrid nanoparticles. The main aim in one-pot process is to carry out the sol-gel reaction of inorganic precursor simultaneously with free radical polymerization of organic monomer. Indeed, in the one-pot method can be introduced as a useful novel reinforcement technique which in the both phases of hybrid particles is generated simultaneously either by forming single individual hybrid particles or beside polymer particles. Recently they have reported fabrication of tunable morphology of nano-size silica-acrylic hybrid particles. Then they have studied production of hybrid materials with well-defined morphology control. Finally, in a most recent work they are investigating potential application of hybrid nanoparticles with different morphology; all these lead to control final properties like mechanical properties via morphology control. They investigated morphology control for alumina/polacrylate hybrid nanoparticles dealing with various properties such as mechanical and optical properties. It was revealed that mechanical, antibacterial and optical properties depend strongly to the morphology of hybrid nanoparticles. They are going towards facile and rapid production of controlled morphology hybrid nanoparticles with well-known properties for a defined application.

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## Shrikaant Kulkarni

Vishwakarma Institute of Technology, India

### BIOGRAPHY

Shrikaant Kulkarni holds MSc, MPhil, PhD in Chemistry and has been in teaching and research for more than 30 years. Currently he is working in Vishwakarma Institute of Technology, India as senior faculty of Chemistry. He has over 70+ publications; four book chapters published by reputed international publishers, four books in Engineering Chemistry as a co-author, and have been serving as an Editorial Board Member for many reputed international journals.

[srkulkarni21@gmail.com](mailto:srkulkarni21@gmail.com)

### HYDROGEL SYNTHESIS FOR DYE AND HEAVY METAL REMEDIATION

Hydrogels are the three dimensionally cross-linked (chemically or physically) polymeric networks which can retain huge amount of water without getting dissolved in it. The cross-linked structure of hydrogels can be used for the remediation of organic and inorganic contaminants from the industrial waste streams apart from applications in many other areas. This paper presents the synthesis of Poly (Acrylamide-co-Acrylic acid) hydrogel using solution polymerisation technique and the effect of variation in concentration of cross-linker initiator, strengthening agent, monomer ratio on the consistency and behavior of hydrogel in terms of its hygroscopicity and dye remediation was examined which show encouraging results and hold lot much of promise and potential for treatment of waste in industry.