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Arthur E. Martell Early Career Researcher Author's Prize

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Arthur E. Martell Early Career Researcher Author's Prize

I congratulate Dr Rosenani A. Haque, the recipient of the first Arthur E. Martell Early Career Researcher Author's Prize for her 2014 published manuscript, Counterion-induced modulation in biochemical properties of nitrile functionalized silver(I)-*N*-heterocyclic carbene complexes, *J. Coord. Chem*. **67**, 3649–3663 (2014). The prize winner was announced at our Editorial Board Meeting on 23 March 2015.

Professor Arthur E. Martell was founding Editor of the *Journal of Coordination Chemistry* in 1971. A pioneer in the field of metal chelate complexes, Martell went to Texas A&M University in 1966 as Head and retired in 2001 as Distinguished Professor. As founding Editor and Editor for 10 years, Art Martell was instrumental in the growth of the *Journal of Coordination Chemistry*. He continued as an active reviewer and Editorial Board Member until his retirement. The Early Career Researcher Author's Prize is named in his honor.

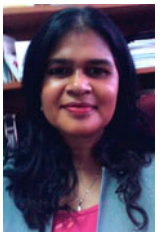
Dr Rosenani Haque received her PhD from the University of Western Australia in 2008 and is on the academic staff of the Universiti Sains Malaysia. Her work on N-heterocyclic carbenes has resulted in over 70 published articles, including two review articles. Dr Haque's collaborator on the award winning manuscript is her PhD student, Patrick Asekunowo.

We will be taking nominations for the 2015 Arthur E. Martell Early Career Researcher Author's Prize ($1000 USD) for high quality manuscripts published in the *Journal of Coordination Chemistry* in Volume **68** through 31 January 2016. To be eligible, the author must be within eight years of receiving her/his PhD and in a full time academic or government laboratory position. The nomination must include: (1) the article to be considered for the Arthur E. Martell Early Career Researcher Author's Prize; (2) the date when the nominee received his/her PhD and his/her current position; and (3) her/his contribution to a multi-author article. Only one author per published article will be considered. The Editors will make the final decision. The prize winner for 2015 will be announced in April of 2016.

Again, congratulations to Rosenani A. Haque for winning the 2014 Arthur E. Martell Early Career Researcher Author's Prize. Her article is available free online until 31 March 2016.

Jim D. Atwood
Editor
Journal of Coordination Chemistry

Arthur E. Martell Early Career Researcher Author's Prize winner profile



Name: Dr Rosenani A. Haque
Institution: The School of Chemical Sciences, Universiti Sains Malaysia, 11800 USM, Penang, Malaysia
Winning article: Counterion-induced modulation in biochemical properties of nitrile functionalized silver(I)-N-heterocyclic carbene complexes

How would you summarize your paper for an undergraduate?

This paper studies the biological properties of benzimidazolium-based Ag(I)–NHC complexes, having bromide (Br^-), hexafluorophosphate (PF_6^-) and tetrafluoroborate (BF_4^-) counter-ions. The aim of the work was to find whether counter-ion type influences the biological activity of these complexes. It was found in each case that variation of the counter-ion of the complexes affected their antibacterial activities. The derivative with the Br^- (MIC, 12.5–25 μg mL^{-1}) was more effective than its PF_6^- and BF_4^- counterparts (MIC, 25–50 μg mL−1) against both strains of bacteria. In order to assess their possible mode of action(s), circular plasmid pTS414 DNA/RNA was exposed to gel electrophoresis and it was found that all the complexes show interactions with DNA or RNA in the absence of an oxidant. A possible explanation of the results obtained is presented. Namely, it seems that the greater efficiency of [Ag(I)–NHC] Br^- to destabilize the bacteria membranes in comparison with other counter-ions can be attributed to greater mobility and smaller radius of the hydrated bromide ion, which in turn leads to more intensive interaction with such lipid bilayer (a membrane that forms a continuous barrier around all cells) in comparison to other analogs. Due to the interactions of these complexes with DNA or RNA, this result has provided some preliminary indications into the mode of action that may control the observed antibacterial behavior of these complexes.

What are the practical implications of the research described in your paper?

The data from this study reveal several practical applications worthy of future studies. First, this study suggests that counter-ion modulation has the potential to significantly improve drug targeting and delivery; it is increasingly evident that drug delivery mechanisms involving an assembly of molecules, or changes in their conformation, are often counter-ion dependent, and may therefore be conveniently modulated by counter-ion selection. Secondly, when combined with other modifications such as lipophilicity, counter-ion modulation has the potential to significantly improve drug targeting and delivery. We have to recognize and understand its utility to unlock the full potential.

How do you see your research area developing in the future?

Interest in metal complexes of NHC heightened after Arduengo's isolation of stable crystalline free NHC in 1991, although research in this area started much earlier. To date, almost all transition metals and main group metals have been complexed with NHCs. The applications of the new NHC complexes are widespread. Catalysis is one significant area, slowly replacing the traditionally used phosphine catalyst as 'phosphine mimics.' Silver- and gold-NHC complexes in particular have gained immense interest in recent years as potential antimicrobial and anticancer agents. Recent reports have highlighted several silver-NHC complexes active against a variety of bacterial strains associated with cystic fibrosis and chronic lung infections. Gold complexes of cyclophanes have been tested for biological applications and have shown interesting antimitochondrial activity, with some selectivity for mitochondria in tumor cells over normal cells. A wide range of transition metal drugs have been at various stages of development; however, none of them could pass all the stages of clinical development until today. Some coordination compounds lose their effect by releasing the metal ion before reaching the target. This problem highlights the dire need for finding potent drugs for various biological applications. Recently, M-NHCs appeared as a rapidly growing field of research in medicinal chemistry and I can see in future this area will continue to be important.

Who or what inspired you to get involved in this research?

My interest in the synthesis and applications of metal complexes of N-heterocyclic carbene (NHC) was initiated by Professor Murray Baker of the University of Western Australia during which time I was pursuing my PhD studies. Prof. Baker pointed out the stability of Pd complexes of NHC 'cyclophanes' that in turn gave outstanding catalytic applications in C–C coupling reactions. The cyclophanes were imidazolium-linked with arene groups in the ortho-positions, mostly. Prof. Baker pointed out different type of linkages, i.e. the meta and para that could provide extra stabilities and produce interesting geometries of complexes. I started experimenting with them, under Prof. Baker's supervision and began studying the stabilities of the salts and complexes via NMR and extending my metal to other transition elements such as Ag, Hg, Ru in addition to Pd. We were getting interesting results through X-rays and other spectroscopic analyses. When I finished my studies, I came back to Universiti Sains Malaysia and started my own lab continuing where I left. We then moved further to study the biological applications of the complexes such as in anticancer and antimicrobial activities.

How did you feel winning the *Arthur E. Martell Early Career Researcher Author's Prize* and what does this mean to you?

I feel happy and honored to win the *Arthur E. Martell Early Career Researcher Author's Prize*. This is an international and a prestigious prize as it is conferred by a highly reputable journal. To me, personally, this means that my work is recognized and at par with other researchers. I feel that I am contributing to the scientific community and my work doesn't go unnoticed. As a whole, this award shows that we scientists from developing countries are moving forward in scientific research at the same rate as our peers from developed countries and that's a good development. However, this award would not have been possible without the work of my PhD student, also the co-author of this article, Patrick Asekunowo.

Biography

Rose Haque was born in 1963 in the state of Kedah, Malaysia. She did her undergraduate studies in chemistry at Sonoma State University, California, then her Msc in physical organic chemistry in San Jose State University, California, where she graduated in 1987. She then worked as a teacher while raising her three children.

In 2002, she continued her education to a doctorate studies at the University of Western Australia (UWA) under the supervision of Professor Murray Baker. At UWA, she started her research on metal complexes of N-heterocylic carbine, focusing on the synthesis and studying the properties of the complexes such as their stabilities, geometries, methods of preparations, cyclic voltametric behavior, and preliminary applications in catalysis. During this time, some novel complexes were obtained. In 2008, she obtained her PhD degree and moved back to Malaysia to work as a lecturer in Universiti Sains Malaysia, Penang. She set up her lab and continues her work on metal complexes of NHC, extending it to biological applications. Her work is supported by the Research University grants provided by Universiti Sains Malaysia and the facilities and support provided by the School of Chemical Sciences and the dean of the school.