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Some Investigations Based on Photochemistry, Natural Product Chemistry and Environmental Chemistry

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Editorial

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Closed shell d^{10} atoms such as gold(I) and silver(I) shows remarkable tendency to form supramolecular aggregations due to Au-Au, aurophilic bonding and Ag-Ag, argentophilic bonding [1,2]. Many evidences reported in the literature showing different aggregates such as dimers, oligomers and polymers are formed due to these types of interactions [1-4]. Our research group is focused on luminescence properties of dicyano complexes of Au(I) and Ag(I) due to the formation of excimers and exciplexes [5-7]. Excited state dimers are referred as excimers and excited state oligomers are referred as exciplexes. We were able to tune excimers and exciplexes by varying the excitation wavelength and the dopant concentration [6,7]. We have observed and reported mixed metal transition in Au/Ag dicyanide compounds [8]. Now we are interested to extend our studies to dicyano complexes of d^8 closed shell systems.

Our research group have also focused on optical memory studies on dicyano complexes of Au(I) and Ag(I) [9]. Optical memory is an exciting phenomenon which is analogues to "write, read and erase" phenomena. Using a small crystal like KCl doped $KAg(CN)_2$, one can irradiate the crystal using a 265 nm laser at very low temperature which is analogous to "write", then record the luminescence properties analogous to "read", then by keeping the crystal in dark, the memory can be erased which analogous to "erase" process. Optical memory of these types of crystals can be applicable to make new optical devices.

Cyanodon dactylon is being used as a supplementary medicine in Ayurvedic medical system in India to increase the red blood cells of people who suffer from anaemia [10]. We investigated different classes of compounds present in the plant using extraction methods and phytochemical screenings [11]. Further investigations need to be done to identify active compounds and the feasibility to use in human consumption.

Selenium is an essential element to the human body but it plays the dual role. At low levels it is deficient but at higher levels it is toxic. Therefore, US Food and Nutrition Board of the Institute of Medicine recommended dietary allowances (RDAs) for selenium [12]. But in Sri Lanka, there is no any evidence regarding selenium levels of our consumable food. Therefore, we started analyzing selenium levels of our edible food and reported selenium levels of some consumable food in Sri Lanka [13].

Arsenic is a metalloid and a natural element which can be exposed to the environment by different processes such as mining, coal burning, usage of pesticides, wood preserving arsenicals etc. In Sri Lanka, arsenic contamination is mainly due to the usage of pesticides [14]. Sri Lankan farmers use huge amounts of pesticides for different agricultural purposes. Recently, there is a myth throughout the country about arsenic contamination in rice and water bodies. The effects of arsenic depend on the chemical form and the extent of exposure [15]. Since inorganic arsenic is more toxic than organic arsenic, it is always better to check different species of arsenic present rather than determining total arsenic. Recently, a large number of patients of chronic kidney disease are reported in some parts of Sri Lanka and many scientists suspect that one cause may be the arsenic present in rice and water. Currently, we engage in this project with the collaboration of University of Canberra to find a solution by studying arsenic speciation.

It has been reported in the literature that the heavy metals absorption is alleviated using silicon compounds [16-18]. Some leafy vegetables are known to be fast heavy metal absorbers [19]. We have moved our attention to investigate alleviation of heavy metal absorption using silicon compounds in different vegetables.

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