

# **Electrospun Nanomaterials for Drug Delivery, Tissue Engineering, and Cancer Therapy**

Snr. Prof. KM Nalin de Silva

*Head and Chair Professor of Chemistry of Department of Chemistry, University of Colombo, Sri Lanka*

Senior Professor KM Nalin de Silva, Head and Chair Professor of Chemistry of the Department of Chemistry, University of Colombo was the first speaker of the BAS Plenary Session. Prof. de Silva presented on the topic “Electrospun nanomaterials for drug delivery, tissue engineering, and cancer therapy”. He discussed a few important aspects in general before he comes to the main topic. He mentioned it is crucial that the research has to be transformed into society and society should be benefited. Prof. de Silva mentioned there were three industrial revolutions that happened after the 17<sup>th</sup> century. Currently, we are on the fourth industrial revolution, which has an exponential or destructive innovation where one innovation replaces a number of existing innovations. Therefore, the scientist’s role is to impart and impasse with society. If not, we will have to keep on importing the technology which is a major factor that affects the development of the country. Although economic recessions are all over the world, the leading countries have their science and technology programs keep moving and the technology keeps on advancing and miniaturized due to advanced material. Prof. de Silva mentioned state-of-the-art space shuttles, space suits, planetary defense missions, and Tesla cars as some of the examples for the great technology advances. It is important to focus on the technologies that will have the most impact to develop of a country. The five technologies that will shape

the planet in the next twenty years: are nanotechnology, biotechnology, artificial intelligence, robotics, and the internet of things. He connected the context with this year’s session theme “Connecting science, technology, and innovation to achieve sustainable development for a secured nation”. To develop sustainably amidst this crisis Sri Lanka has to achieve the UN sustainable goals, most importantly as a country, we have to start with SDG 16, “Peace, justice, and strong institutions”. Prof. de Silva then discussed the seven most important areas that we require to develop advanced technologies for; cure for diseases (Covid 19, cancer), cheap and clean energy, increased demand for pure water, reduced environmental pollution, computing power, world hunger, and defense (including space exploration). Prof. de Silva then entered his main topic on electrospinning as a means of synthesizing advanced nanomaterial, specific synthesis of micro and nano ultrafine fiber with controlled surface morphology. Applications of electrospinning are in numerous areas such as energy, cosmetic industry, the pharmaceutical industry, and defense. Prof. de Silva’s work is focused on wound dressing, drug delivery, and tissue engineering scaffolds. There are numerous parameters to such as applied electric field strength, flow rate, and solution properties that should be manipulated to get the best quality fibers. He said they are using different electrospinning types like, single fluid, coaxial,

side by side, and triaxial by having one, two, or three types of polymer melts. This will give monolithic, core/shell, janus, and triaxial-type fiber morphologies. Electropinned fibers will have high loading capacity, high encapsulation efficiency, simultaneous delivery, ease of operation, and cost-effectiveness. All these can manipulate and hence the drug delivery profile can be manipulated as preferred. Antibiotics, antibacterial agents, or even Ayurveda Rasashastra material can be incorporated to the fibers. Skin tissue regeneration, synthesis of artificial organs, synthesis of bone scaffolds, making cosmetic face masks, and water purification are also other applications Prof. de Silva's research team has done using electrospinning. He mentioned all these applications can be done in a commercial scale. During the discussion, it was highlighted how the government and the private sector should assist in facing the innovation of Death Valley and commercializing the research.