

## **Plastic pollution – Challenges, Environmental Impact and Solutions**

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Plastic materials made from a wide range of polymers are used in almost every aspects of our day-to-day life. However, their design strategy only involves high stability and processability with no circularity or sustainability. Large amounts of different polymers are produced and processed every year, but used polymer based objects are difficult to recycle or reuse due to many reasons. As a result, significant amounts of used plastic materials end up in the environment. Such polymer wastes in the environment undergo slow degradation and release small particles called micro- and nanoplastic particles and chemicals. Even though, many studies pointed out the toxicity of various additive chemicals such as phthalates and bisphenol A, only limited knowledge exist on the impact of plastic particles on terrestrial or aquatic animals. In order to address the plastic waste issues, a few groups are working on developing sustainable polymers to replace synthetic ones. We focus on developing alternate nontoxic materials and to understand the biological impact of plastic particles using both animal and human cellular models. Our results indicate that toxicity or adverse health impact of the micro- and nanoplastic particles depends on the choice of animal models and chemical nature of nanoplastic particles used. In a comparative study, fluorescent polymethylmethacrylate (PMMA), and polyvinylchloride (PVC) nanoparticles were used to explore the uptake, translocation, and toxicity in various biological models. PVC nanoparticles caused high mortalities in different animal and cellular models. The talk will provide some of our recent results and challenges in this emerging area.