NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

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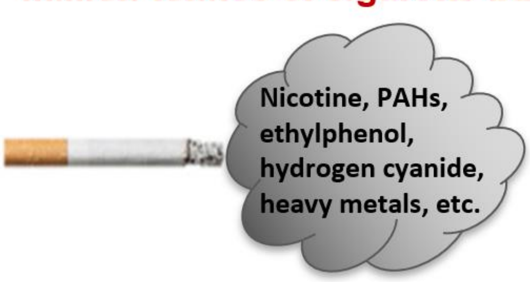
QUANTITATIVE ASSESSMENT OF ENVIRONMENTAL IMPACT OF DISCARDED CIGARETTE FILTERS

Abstract:

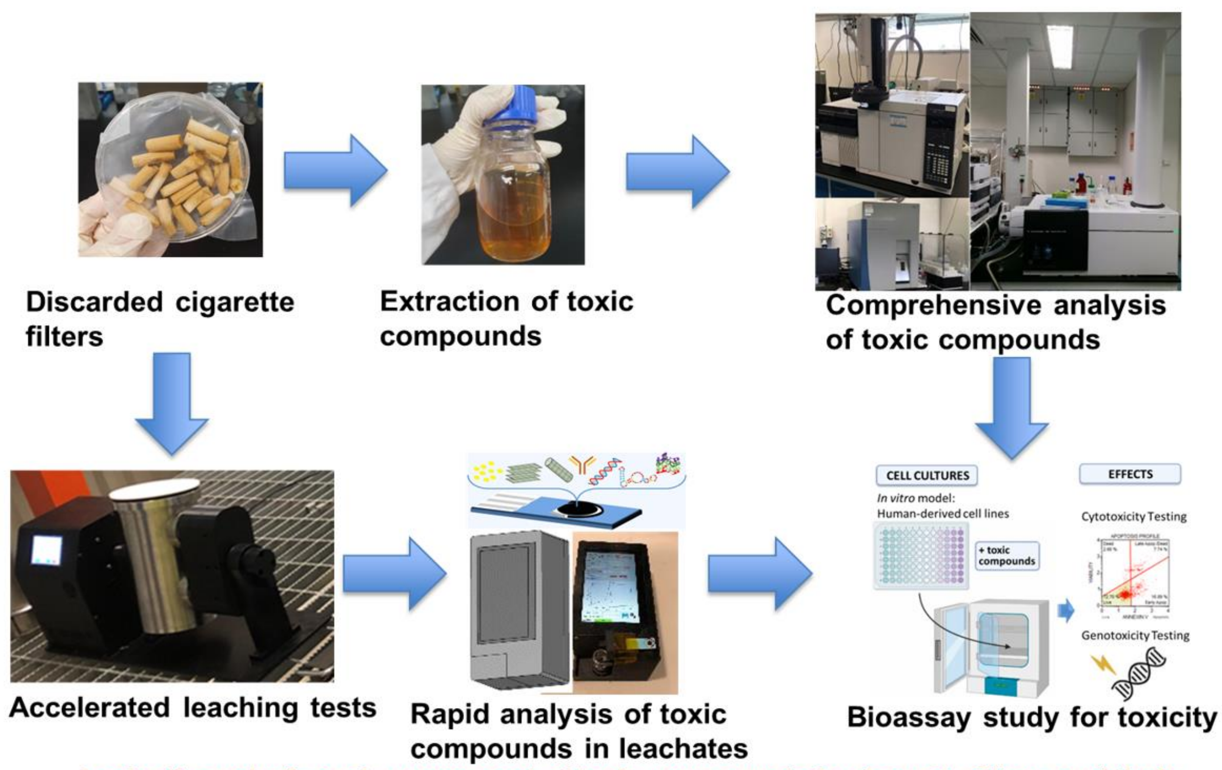
Improper disposal of smoked cigarette filters (CFs) is an emerging environmental concern with both public health and ecological implications. In Phase 1, NEWRI investigated the material properties of smoked CFs and demonstrated the feasibility of upcycling them into cellulose through a process developed in-house. While this approach shows promise, the structural characteristics, quality, and industrial applicability of the resulting cellulose require further evaluation to complete the upcycling pathway.

In parallel with exploring recycling solutions, there is a critical need to assess and quantify the environmental impacts of improper CF disposal. Understanding the leaching of chemicals, microfibers, and biopolymers from discarded CFs in both natural and urban environments will help prioritize cleanup strategies. For example, CFs discarded in urban areas (e.g., outside buildings) may present minimal environmental risk beyond being visually unappealing, whereas those left on beaches or shorelines could release harmful pollutants into marine ecosystems, posing a more serious environmental threat. Quantifying these differences will provide a clearer picture of the overall disposal impact and inform whether natural degradation, without intervention, could be a viable management approach.

Six trillion cigarettes are produced every year globally, leading to more than 1.2 million tonnes of cigarette butt waste.



Cigarette filters trap hundreds of toxic chemicals



In-depth analysis and assessment of toxic compounds in cigarette filters and their environmental release processes

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