Field based detection and remediation strategies for microplastics

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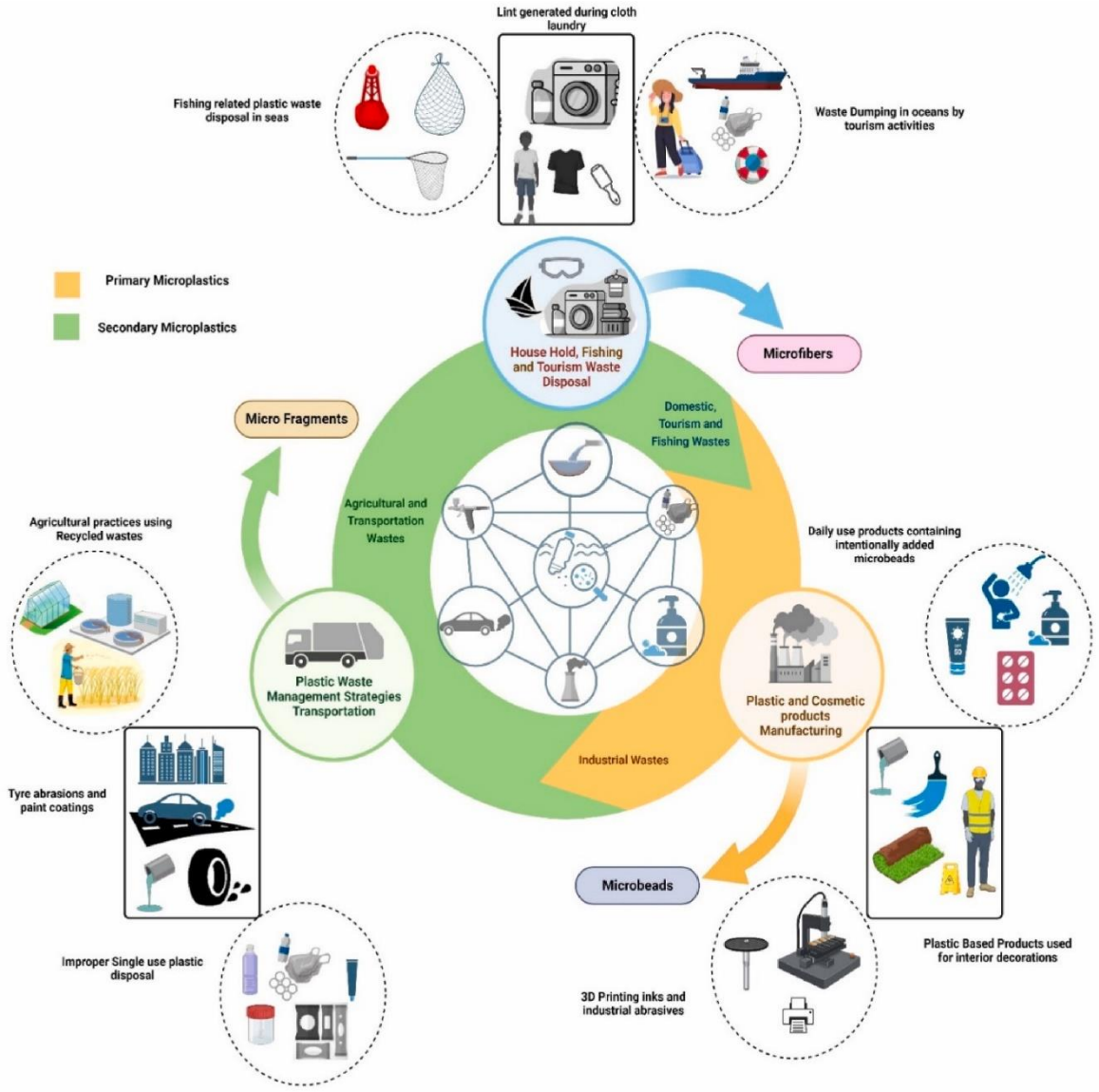
Sources of Microplastics in the Environment



Primary microplastics, measuring less than 5 mm, are intentionally integrated into commercial products during manufacturing.
Secondary microplastics are fragments released from larger plastics post-disposal, resulting from material abrasions and changing environmental conditions

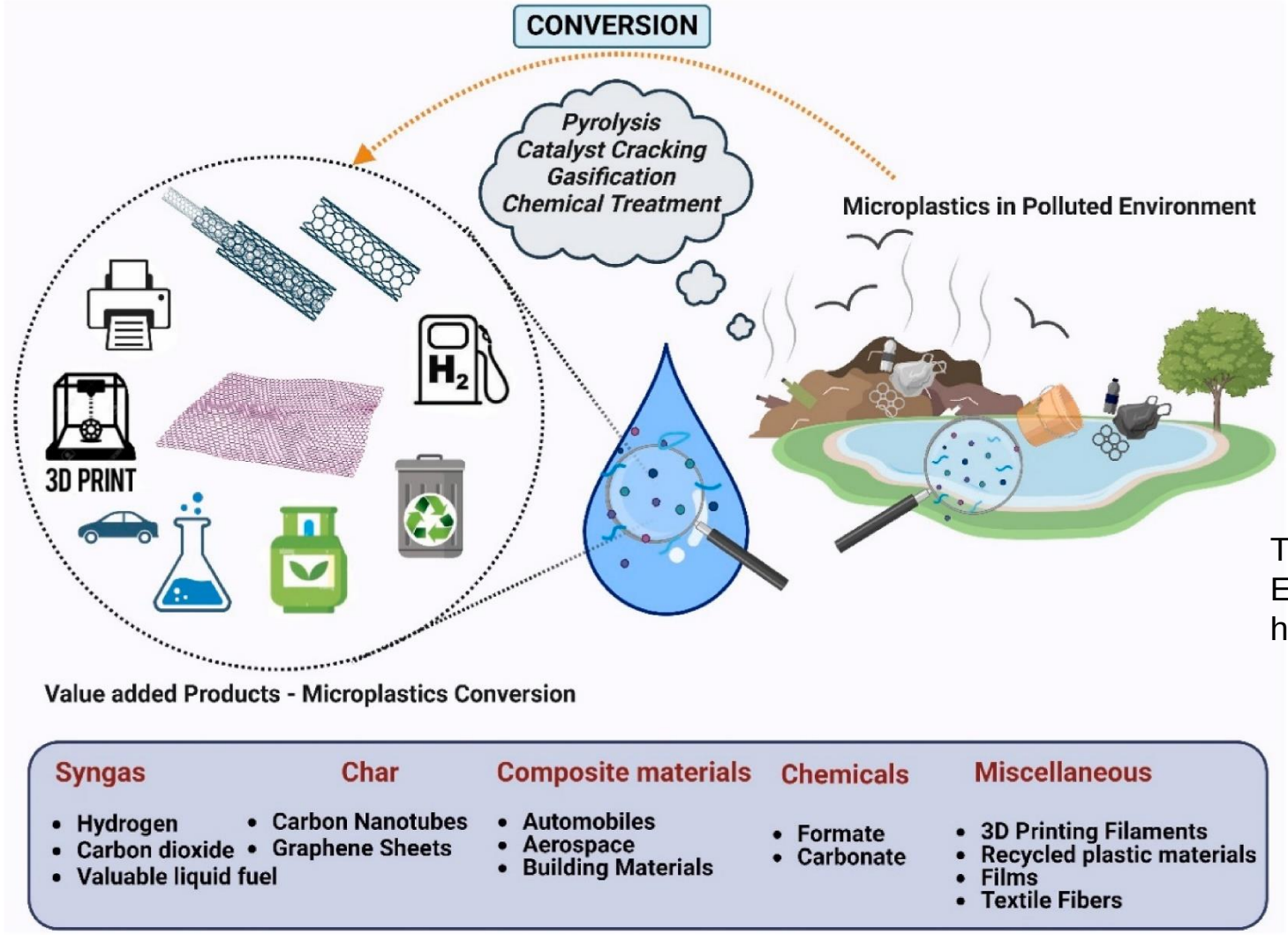
Thacharodi et al 2024. Journal of Environmental Management 351 119988. https://doi.org/10.1016/j.jenvman.2023.119988

Typical methods for the analysis of microplastics in the environment

Methods	Advantages	Limitations
Visual analysis	Simplicity, low cost, low chemical hazard.	Time consuming and laborious-low accuracy and efficiency.
Scanning electron microscope-energy dispersive x-ray	Promising technology-simultaneously analyses surface morphology and elemental composition.	Complicated pre-treatment. Low efficiency /high cost. Estimation accuracy is not high, and colour cannot be distinguished.
Fourier Transformed infrared spectroscopy	Details chemical bonds and functional groups. Widely used in qualitative detection and analysis of microplastics.	Can only be used for identification of microplastics above 20 μm. Easily affected by various factors.
Raman spectroscopy	Can be used to identify microplastics below 20 μm. Samples do not need to be dried and dehydrated.	Relatively long detection time. Needs further improvements.
Thermal analysis	Analyses microplastics as a function of temperature and time. Can be applied in chemical characterisation and mass concentration of microplastics.	Sample pretreatment is cumbersome. Also destructive to environmental samples, so cannot be used for assessing physical properties.
Mass spectrometry	Can be used for chemical characterisation analysis and quantification of microplastics in environmental samples.	This method is so far incapable of quantifying total microplastics in the environment

Huang et al 2023. Environmental Chemistry Letters 21:383–401
https://doi.org/10.1007/s10311-022-01525-7

Mitigating microplastic pollution: variety of value-added products derived from the conversion of plastic wastes



These diverse products result from microplastics extraction methods such as pyrolysis, chemical treatment, catalytic cracking, and gasification, particularly in contaminated environments.

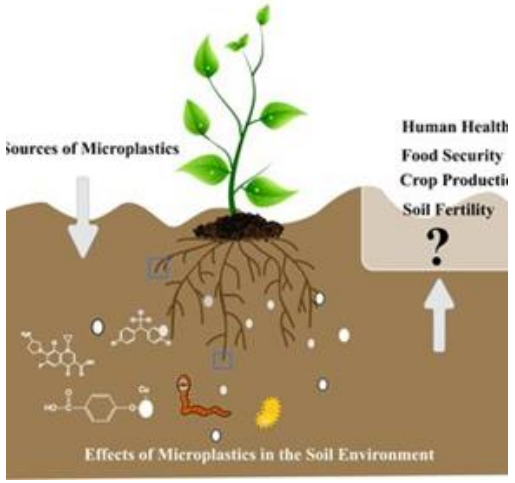
Thacharodi et al 20204. Journal of Environmental Management 351 119988. https://doi.org/10.1016/j.jenvman.2023.119988

RP4 Mitigating the risk of microplastics

- Technologies to quantify and identify microplastics in Australian environments
- Address concerns about microplastics and protecting food exports

Develop methods to assess microplastics in environmental matrices

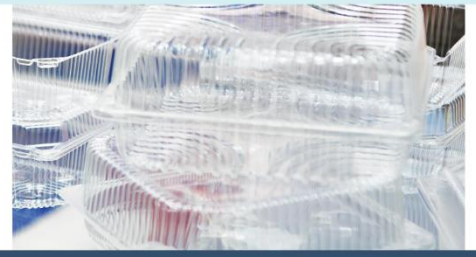
- Develop critical threshold values for microplastics in soils and food
- Assess technologies for remediating microplastic contamination



Target: Reducing the cost to detect, characterise and quantify microplastics in soils



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