Abstract – Addible, Speaker: Fergal Byrne

OxyCycle - A novel oxidative devulcanisation and desulfurisation process allowing selective recovery of individual rubbers, metals, textiles, and carbon black

The use of tyre rubber waste as a resource is complicated due to its chemical structure The vulcanisation process involves cross-linking polymer chains using sulfur bridges (e.g., C-S-S-C). Once cross-linked the polymer is no longer soluble or meltable, limiting downstream re-processing options. Furthermore, the sulfur content means pyrolysis of waste tyres is complicated as sulfur poisons many common catalysts required in that process.

Oxidative devulcanisation is one proposed technique that employs the use of oxidising agents (e.g., ozone, hydrogen peroxide, benzoyl peroxide) to break the S-S bonds. However, controlling the oxidation process so as not to oxidise (damage) the rubber polymer chains is difficult, and sulfur can re-vulcanise the rubber chains unless it is quickly removed from the mixture.

Addible has developed a novel safe and green oxidising agent which can oxidatively devulcanize rubber tyres in a controlled manner, removing the sulfur, and allowing complete solubilisation the rubber for reprocessing. Recovery of textiles, metal and carbon black is also facilitated. This new recycling technology can revolutionise the global tyre recycling ecosystem.