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An overview of green processes and technologies, biobased chemicals and products for industrial applications

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Abstract

Recently, there has been a paradigm shift towards 'greener' processes/products, with emphasis being placed on sustainability. The traditional manufacturing processes require re-working and adapting new methods to ensure that they are more efficient, cleaner and ideally cost-effective. There are multiple biobased market sectors that can be adapted towards a greener initiative, namely, biobased chemicals, biofuels and biomaterials (i.e., biobased foods, bioplastics, biosurfactants and biolubricants). This review focusses on greener and sustainable chemical processes feedstock replacements, and products, with a focussed approach in which bioproducts can be introduced into the petroleum-driven market as direct replacement (the biobased product and petroleum product are chemically identical), functional replacement (two types of products are chemically different however they have similar functions/properties) and/or through novel products (the bioproduct is not similar in properties/structure or function). This article highlights widely adopted biobased chemicals with immediate potential as biorefinery 'value-added products'; furthermore, current status and future prospects of biological routes to biobased products using raw materials, wastes and residues as renewable resources. The study outlines future prospects and challenges with taking the biological routes to biobased products using renewable resources.