The current problems associated with functional polymers and plastics Plastic production in the world is estimated to have reached 348 metric tonnes in 2017 [110].The concept of "green chemistry" has been successfully applied in a variety of industries, including automobile, cosmetic, energy, and pharmaceutical, to name a few [112]. And it is clear that its success in its foray into the industrial field is due to a confluence of factors such as the recognition of the possibility of extinction, the association of the adjective "environmentally friendly" as a positive characteristic of products, and a population increasingly identifying with the importance of preserving the environment.Thus, mechanical recycling is commonly used in thermoplastic polymers to produce the raw materials to manufacture new products through the selection, washing, compaction, and palletization of plastic waste; however, after several cycles of recycling, the mechanical properties of the polymers can be altered to the point of losing practical applicability, and the reuse of material is limited depending on the initial type of application.Unfortunately, many commercially used polymers are derived from nonrenewable sources, and as a result, they are environmentally hazardous due to their low biodegradability and high accumulation rate, making them a global problem [110].Furthermore, increasingly stringent regulations .[have an impact on the productive sectors.[112