New Value-Added Sustainable Green/Biobased Materials from the Byproducts of Corn Ethanol Industries: Challenges and Opportunities

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The United States is the largest producer of corn in the world. The use of corn in ethanol industries has a remarkable trend. The conversion of corn into bioethanol is approaching to industrial viability; however value-added new green/biobased materials need to be developed from the byproducts that would provide substantial economic return to corn ethanol industry as well as would create more job opportunities in rural America. The CGM (corn gluten meal) and DDGS (distillers' dry grains with solubles) are the prime byproducts from the corn ethanol industries. The CGM is obtained from the wet milling process while DDGS is obtained from dry milling process of ethanol industries. One of the major uses of such inexpensive byproducts is in animal feeds. One possible way to get value-added materials from byproducts is by converting these in to bioplastics. Some of the major drawbacks of CGM/DDGS in converting these in to bioplastics through melt processing are their brittleness; hydrophilicity; rigid and stiff nature; and low temperature thermal degradation. A group of researchers at Michigan State University are striving to develop new value-added biodegradable plastics and novel green materials from such byproducts through various approaches including destructurization by suitable chemical treatment, plasticization, blending and composites.