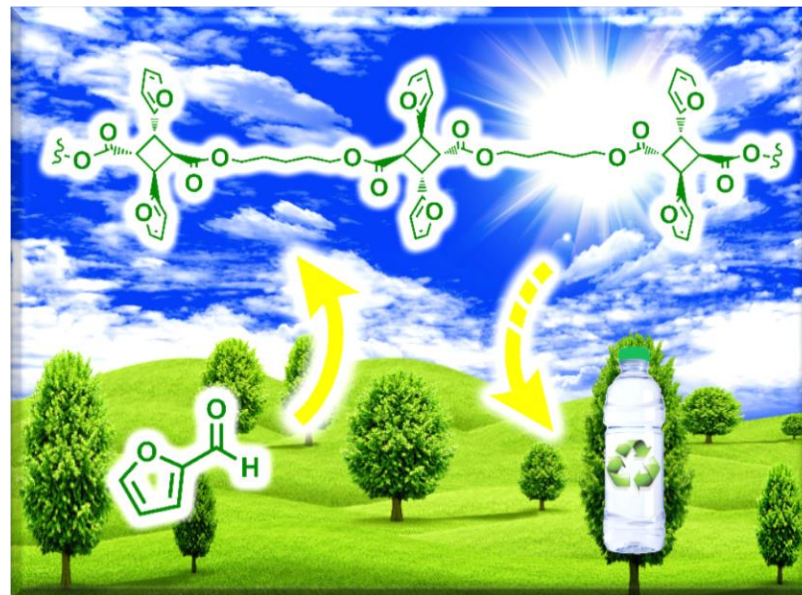


CENTER FOR SUSTAINABLE MATERIALS SCIENCE (CSMS) develops novel plastics from bio-based starting materials through solvent-free photoreaction in sunlight

Outcome: Novel thermoplastics were developed from biomass-based starting materials by researchers at the Center for Sustainable Materials Science in North Dakota. The product showed promising chemical and thermal stability.

Impact/Benefits: The new bio-based thermoplastics are similar to polyethylene terephthalate (PET), which is widely used in beverage bottles. The polymerization step was solvent-free and used sunlight as an energy source. Thus, the polyesters or their congeners may have potential to be used as a greener PET alternative.

Explanation: The world depends heavily on petroleum as its main source for chemicals. The rapid growth of the world's population and irreversible consumption of fossil resources require a new generation of sustainable materials. The novel thermoplastic was synthesized by using furfural, which can be obtained from corncobs, and malonic acid, which exists in high concentrations in beetroot. The biomass-derived starting materials were first turned into photoreactive intermediates by classic organic synthesis. The photoreactive materials were then placed in sunlight. After 12 hours of absorbing solar energy, the intermediate molecules connected with each other and formed novel linear plastics by a solvent-free process.



Showcasing collaborative Research from CSMS, which has been published and featured as a cover story of the journal *Green Chemistry*. The research team includes: graduate students Zhihan Wang and Brent Kastern, undergraduate students Katelyn Randazzo, Jonathan Butz, and David Seals in Prof. Qianli Rick Chu's group at UND Chemistry Department. The research team also includes Dr. Angel Ugrinov and Prof. Mukund Sibi from the Department of Chemistry and Biochemistry at NDSU.

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