PURDUE INNOVATES | Office of Technology Commercialization

Development of Industrial Hemp based Biodegradable Superabsorbent

A sustainable, hemp-derived superabsorbent substitute offers high-capacity absorption and adjustable properties for applications ranging from hygiene products to eco-friendly food packaging, drastically reducing global polymer waste.

Researchers at Purdue have developed a biodegradable superabsorbent substitute using hemp plants. Common superabsorbent polymers are largely used in various industrial sectors, such as food packaging, baby diapers, sanitary pads, biosensors, and water retainment in the agricultural field. Those polymers can cause skin irritation, infections, and soil salinization, in addition to not being biodegradable and sustainable. Purdue researchers sought an alternative in hemp, which is renewable, abundant, and biodegradable. Using cellulose extracted from hemp hurds (inside core) and bast (outside layer), Purdue researchers refined this technology to achieve high absorbent capability and adjustable absorption capacity as needed. This shows immense potential to expand the hemp products market and also add to a more sustainable economy for all. This technology can largely reduce polymer waste worldwide, leading to lower landfill costs and reducing environmental impact.

Technology Validation: The prepared superabsorbent from hemp displayed a high absorption capacity and structural tunability to the desired application. Biodegradable superabsorbent developed from hemp hurd showed (235 g MilliQ water absorbed/g fiber) higher absorption capacity compared to the one developed from hemp bast (65 g MilliQ water absorbed/g fiber).

Advantages:

-Renewable

-Plant-based material

-Biodegradable

Technology ID

2023-SIMS-70273

Category

Chemicals & Advanced Materials/Green & Bio-Based Chemistry

GreenTech/Circular Economy & Waste Reduction

Materials Science & Nanotechnology/Advanced Functional Materials

Authors

Marguerite Bolt

Laila Hossain

Senay Simsek

Ronald F Turco

Further information

Dipak Narula

dnarula@prf.org

View online

Applications:

-Personal hygiene products

-Baby diapers

-Green products

-Encapsulated superabsorbent material

-Eco-friendly food packaging absorbent pad

-Colorimetric biosensor

-Biodegradable water retainer for agriculture use

Related Publications:

https://www.purdue.edu/newsroom/releases/2024/Q2/purdue-researchers-develop-sustainable-biodegradable-superabsorbent-materials-from-hemp.html

https://www.thecooldown.com/green-tech/superabsorbent-hemp-materials-sustainable/

TRL: 4

Intellectual Property:

Provisional-Patent, 2023-07-10, United States | PCT-Patent, 2024-07-09, WO

Keywords: biodegradable superabsorbent, hemp cellulose, plant-based material, eco-friendly food packaging, baby diapers, personal hygiene products, water retainer for agriculture, sustainable polymer alternative, hemp hurd, biosensor, Agriculture, Biodegradable, Green Technology, Hemp Applications, Superabsorbent