

Biochemical Degumming of Ramie fiber for fiber quality improvement

Applications

In recent times, the needs of natural fiber utilization are increasingly drawing attention among the researchers due to the environmental awareness. Ramie is one of the oldest fibers known especially for its ability to hold shape, reduce wrinkling, and providing a silky lustre to the fabric appearance. The innovator here uses a biochemical process for removal of the gum which enables the fiber to take a more crystalline form. This degumming process increases tenacity, wet strength and extensibility. The degummed fiber is often blended with cotton, linen, wool, silk, and lyocell. It could also be formed into thread without blending. Outside the clothing industry, ramie is used in

- Canvas
- Fish nets
- Upholstery fabrics
- Straw hats
- Handicrafts
- Insurance rope



Intellectual Property

Microbial consortium and process for degumming of Ramie fiber.

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Indian Patent 201931048663 (Filed)

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Categories of this invention

- Materials
 - Fabrics, Fibers & Textiles
- Lifesciences
 - Biotechnology
 - Synthetic Biology



Ramie Processing

Fig. Handloom Products

Technology

Chemical degumming results in fibril-released coarse and brittle fibers and the chemicals used are often detrimental to the environment upon discharged. This problem has been addressed in the present invention by processing the post-harvest raw fiber with partial chemical treatment with microbial degumming of the fibers for 72 h at 37 °C using a novel tailor-made bacterial formulation with *Bacillus thuringiensis* MCC2138 and *Bacillus subtilis* ABDR01. The extracellular microbial enzyme-based degumming without the release of fibrils produced a durable, soft, and lustrous fiber with higher tensile strength while utilizing fewer chemicals, thereby leading to lower toxic discharge. The improved texture and strength compared to complete chemical treatment are attributed to even degumming of the fiber ensuring proper spinnability. In addition, each reagent could be reused for making the process more economically viable. Due to its simple, and zero waste processing, this technology is perfect for mass production.

Publications

- Self-sustained ramie cultivation: an alternative livelihood option. *Bioresource Utilization and Management* (365-382), 2021
- Optimization of bio-chemical degumming of Ramie fiber for improved strength & luster. *Biotechnology Reports*. 28. e00532, 2020
- A natural feed to sustain and stimulate the growth of bacteria. *Journal of Bacteriology and Mycology*. 5(2): 1067 (1-3), 2018
- *Bacillus* sp MCC2138: a potential candidate for microbial degumming of Ramie. *International Journal of Fiber and Textile Research*. 5 (3):39-43, 2015

Advantages

- Softer, lustrous and stronger fiber than chemical degumming.
- Uses less water and needs no retting step.
- Processing by-product can be used as a Substrate medium for Vermicomposting.
- Zero Waste Generation
- Environment Friendly

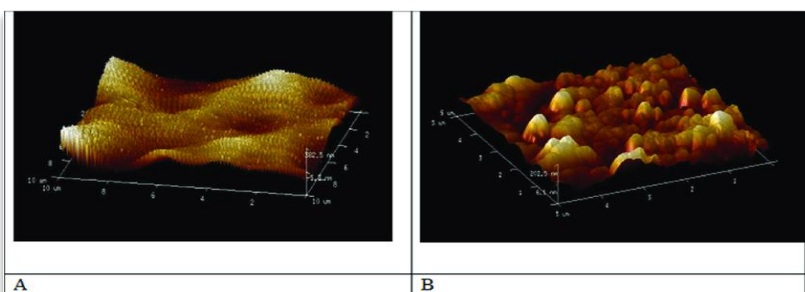


Fig. Atomic Force Microscopy (Bruker Dimension Icon and Bruker Innova) images of (A) Fully chemically treated Ramie fiber with released fibrils represented as spikes (B) image of biochemically treated fiber (partial chemical followed by enzymatic treatment) showing evenly distributed gum on the fiber.

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