

Innovative Hemp-Based Cellulosic Filaments: Sustainability and High-Performance Textile Solutions



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Introduction

As sustainability takes center stage in the global textile industry, innovation is leading the charge toward more eco-friendly materials. A key development in this domain is the partnership between the **German Institutes of Textile and Fiber Research (DITF)** and **RBX Créations**, which has pioneered the production of technical cellulose filaments from hemp using the **HighPerCell®** technology. This report delves into the advancements, processes, and market potential of these hemp-based filaments, with a focus on their application in sustainable textile production.

HighPerCell® Technology: A Sustainable Filament Production Method

Developed by **DITF**, **HighPerCell®** is a cutting-edge spinning technology that enables the eco-friendly production of filaments from renewable biopolymers like hemp cellulose. The process uses ionic liquids (IL), which are non-toxic, stable, and recyclable, leading to minimal environmental impact. **HighPerCell®** distinguishes itself by its low-temperature, closed-loop process, ensuring resource efficiency and versatility in feedstocks.

Key Features:

- Direct dissolution of biopolymers, using non-inflammable, non-toxic solvents.
- Low-temperature process requiring no stabilizers, ensuring minimal environmental impact.
- High adaptability to various raw materials, including hemp, for both textile and technical applications.

Hemp as a Renewable Resource

Hemp offers a highly sustainable feedstock for textile production, requiring no pesticides or irrigation while significantly contributing to carbon sequestration, absorbing approximately 15 tons of CO₂ per hectare. **RBX Créations** partners with large agricultural cooperatives and small farming groups to source hemp, ensuring 100% traceability and sustainability.

France is the leading European producer of hemp, with over 22,000 hectares under cultivation, making it an ideal resource for sustainable cellulose production.

The Iroony® Project: Advancing Hemp Filaments

The collaboration between **DITF** and **RBX Créations** led to the creation of the **Iroony® Project**, which produces high-purity cellulose pulp from hemp using a patented process. This pulp is then transformed into cellulose filaments using the **HighPerCell®** technology. The resulting technical filaments exhibit properties suitable for a wide range of applications, from high-end fashion to industrial uses.

Technical Properties of Hemp-Based Filaments:

- **Hemp Pulp:** High α -cellulose content (>91%) with <0.3% ash content.
- **Filament Properties:** Tenacity between 25-45 cN/tex, titer of 2.0-3.3 dtex, with excellent strength and elongation properties.
- **Sustainable Processing:** 100% dissolvable in IL, ensuring minimal environmental impact during production.

Environmental Impact and Market Viability

The **Iroony®** hemp filaments offer a significantly more sustainable alternative to conventional fibers like cotton, viscose, and oil-based fibers. Initial life cycle assessments (LCA) indicate a

much lower environmental footprint, while the filaments retain high quality and durability. The closed-loop processing system further enhances the sustainability of these filaments, aligning with the growing market demand for eco-friendly textiles.

Applications of Hemp-Based Filaments

The versatility of **Iroony®** hemp filaments makes them suitable for multiple applications across the textile and technical sectors:

- **Fashion and Apparel:** High-end clothing, casual wear, underwear, and footwear.
- **Home Textiles:** Bedding, curtains, and upholstery.
- **Technical Textiles:** Filtration, wipes, and industrial non-wovens.

Conclusion

The partnership between **DITF** and **RBX Créations** in the development of hemp-based cellulosic filaments marks a significant milestone in sustainable textile production. The **HighPerCell®** technology, combined with the environmentally responsible cultivation of hemp, offers a scalable solution for producing high-performance, eco-friendly materials. The success of the **Iroony® Project** underscores the potential of hemp filaments in meeting the textile industry's dual need for sustainability and quality.

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This report showcases the promise of hemp-based cellulose as a cornerstone of the future of textiles, driving the industry towards more responsible, sustainable manufacturing practices.