

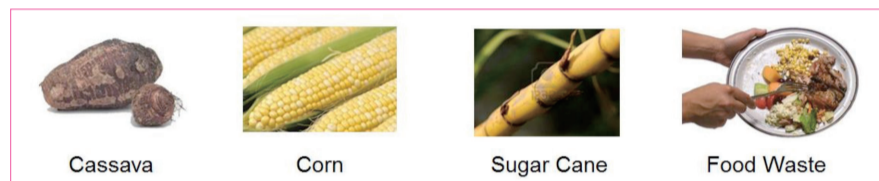
# 新型生物可降解功能紡織品

## New Functional Textiles from Bio-based and Degradable Fibers

### 高附加值紡織品的綠色加工技術

#### Green production technologies for textiles with high added values

團隊採用100%生物基、可降解PHBV/PLA纖維，研發了新型功能性紡織品的低溫染色工藝。此綠色加工技術能提高紡織品的上染率和色牢度，與滌綸染色工藝比較，能節省32%能耗。成品無需添加任何化學助劑，已有優越的天然抗菌、驅蟎性能，且具高附加值，應用範圍廣泛，包括醫用織物、家用織物、內衣及鞋類等。經此技術製成的面料手感柔軟順滑，抗起毛球，抗勾絲，兼備良好的導熱性和懸垂性。



Cassava

Corn

Sugar Cane

Food Waste

生物基可降解聚合物的來源  
Bio-polymers derived from renewable natural sources

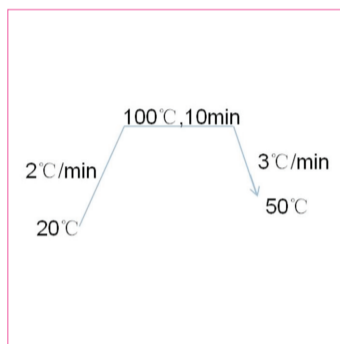


(1) Texturing Machine



(2) Covering Machine

長絲變形和包纏設備  
PHBV/PLA filament texturing and covering machines



低溫染色工藝  
Low-temperature dyeing process

Dyestuffs	Dye uptake		Color fastness to crocking			
	1% owf	2% owf	Dry rubbing		Wet rubbing	
			Walewise (1% owf)	Coursewise (2% owf)	Walewise (1% owf)	Coursewise (2% owf)
Disperse orange 30	96.0	95.8	5	5	5	4/5
Disperse red 74	95.8	95.5	5	5	4/5	4
Disperse blue 79	96.9	76.6	4/5	4/5	4/5	4/5

染色面料的性能指標  
Properties of dyed fabrics

Fabric	Anti-bacterial behavior	
	Bacteria/ fungi	Percentage reduction (%)
PLA/PHBV (70%/30%)	Staphylococcus aureus	99.99
	Klebsiella pneumoniae	99.99
	Candida albicans	99.31

驅蟎性能達到最高級別：AA (根據GB/T24253-2009標準，洗濯20次後仍有62.26%的驅蟎能力)  
Excellent mite-resistance property with the highest anti-mite ranking: AA (62.26% after 20 washing cycles according to Standard: GB/T24253-2009)

原料的天然抗菌驅蟎性能  
Anti-bacterial behavior and mite-resistance without addition of antibacterial agents

This project made use of 100% bio-based and degradable PHBV/PLA fibers to develop a low temperature dyeing process for creating new functional textiles. This green production process of disperse dyes achieves high dye uptake and colour fastness. The process can save 32% energy compared with that for dyeing PET fabrics. The resulting textiles have outstanding natural anti-bacterial and mite-resistant properties without using any additional chemical agents. The research has explored high-value functional applications like medical textiles, home textiles, intimate apparel and footwear. The developed fabrics have soft and smooth hand feel, excellent anti-pilling and anti-snagging performance, thermal conductivity and drapability.

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專利申請編號及國家：201610541297.1 (中國), 201610550526.6 (中國), 201610701034.2 (中國)

#### 特色與優點

- 低溫染色工藝是一種綠色加工技術，較滌綸染色工藝節省32%的能量。
- 高上染率可以減少廢水中染料排量。
- 產品具有優異的色牢度、柔軟順滑、懸垂性良好等特點。
- 可靠而低成本的大規模生產技術，不需添加額外設備或作任何設備上的改動。
- 新技術不需在纖維或加工過程中添加化學助劑，新型功能紡織品已具備天然的抗菌、除蟎性能。

#### 應用

- 醫用紡織品：抗菌敷料、醫用壓力襪、外科手術服和口罩
- 家用紡織品：具有良好抗菌、驅蟎性能的被褥、床褥外罩、床單、枕套、窗簾、帳帳、家具外罩
- 時尚紡織品：防臭抗菌內衣、襪子

#### 獎項

- 第45屆瑞士日內瓦國際發明展 - 評判特別嘉許金獎 (2017年3月)
- 羅馬尼亞科學組織特別獎 (2017年3月)
- 香港綠色創新大獎 - 銀獎 (2017年4月)



針織衫  
Knit-wears PHBV/PLA



醫用壓力襪  
Medical compression stockings PHBV/PLA

Patent Application No & Country: 201610541297.1 (China), 201610550526.6 (China), 201610701034.2 (China)

#### Special Features and Advantages

- The low-temperature dyeing technology is a green production process that saves 32% energy consumption.
- High dye uptake implies low discharge of dyestuff in waste water.
- High quality textiles with excellent properties, such as colour fastness, hand feel and drapability.
- Cost-effective and reliable mass production technologies without the need to use additional / modify equipment.
- The new functional textiles are naturally anti-bacterial and mite-resistant without using any additional chemical agents in the fibers or textile finishing.

#### Applications

- Health care textiles: anti-bacterial dressing, compression stockings, surgical clothing and masks
- Home textiles: duvet or mattress covers, bed sheets, pillow-cases, curtains and draperies, and covers with excellent anti-bacterial and mite-resistant properties
- Fashion textiles: intimate apparel and socks that are odour-free and anti-bacterial

#### Awards

- Gold Medal with the Congratulations of Jury - 45th International Exhibition of Inventions of Geneva, Switzerland (Mar 2017)
- Special Merit Award - Scientific Community of Romania (Mar 2017)
- Hong Kong Green Innovations Awards - Silver Award (Apr 2017)

A research project of HKRITA



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