

Electronic Supplementary Information (ESI) for New  
Journal of Chemistry

**Effect of a novel catalytic system with Savinase 16L and organophosphine compound on shrink-proofing and dyeing properties of wool**

Le Wang,<sup>\*abc</sup> Zhixin Duan,<sup>d</sup> Jinbo Yao<sup>\*c</sup>, Liyan Liu<sup>c</sup>, Pengfei Fei<sup>a</sup>, Zhifeng Yan<sup>a</sup>, Youbo Di<sup>a</sup>, Hua Wang<sup>a</sup> and Jianjun Lu<sup>a</sup>

<sup>a</sup> College of Textile Engineering, Taiyuan University of Technology, Taiyuan 030600, China. Email: wangle9106@163.com

<sup>b</sup> College of Materials Science and Engineering, Taiyuan University of Technology, Taiyuan 030024, China

<sup>c</sup> Jiangsu Sunshine Group, Wuxi 214426, China

<sup>d</sup> State Key Laboratory of Clean and Efficient Coal Utilization, Taiyuan University of Technology, Taiyuan 030024, China

<sup>e</sup> School of Textile Science and Engineering, Tiangong University, Tianjin 300387, China. Email: yao-yaojinbo@tiangong.edu.cn

## **Table of Contents**

1. Supplemental Figure
2. Supplemental Tables

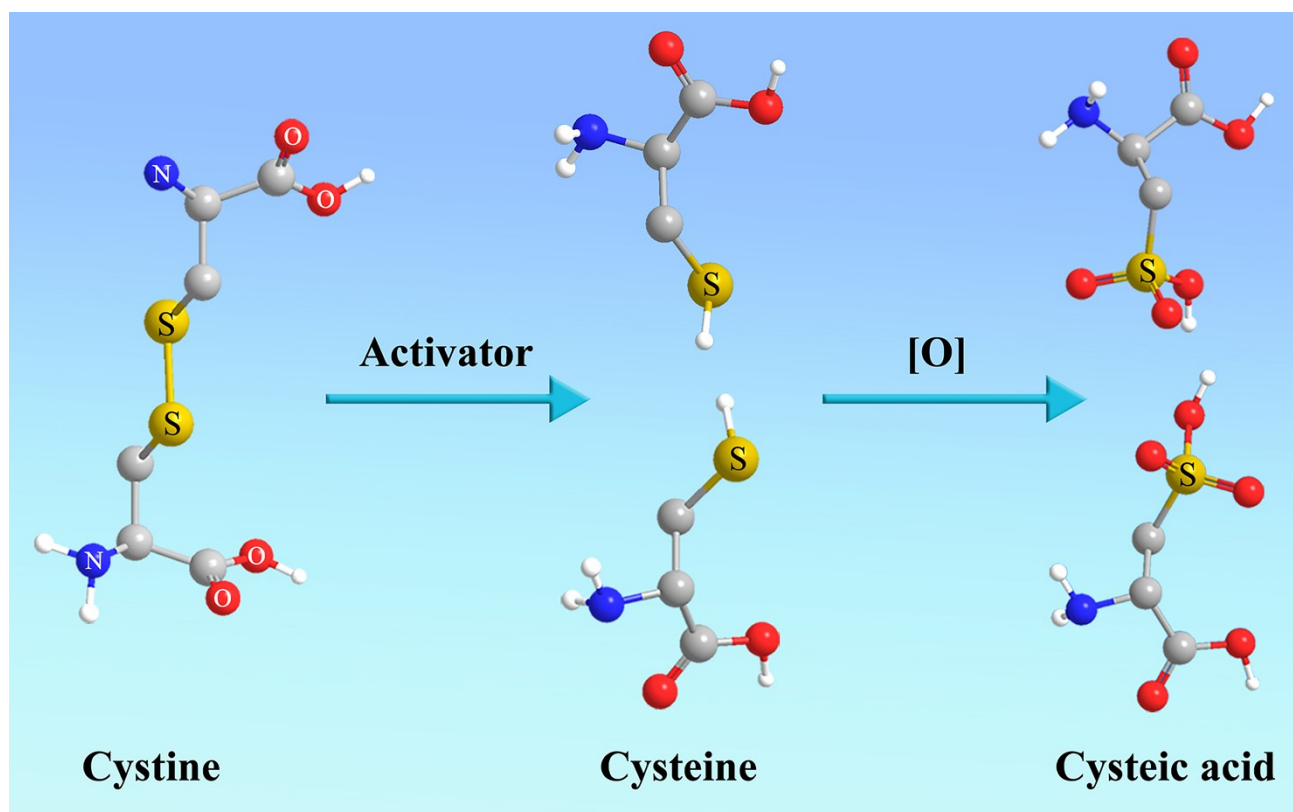


Fig. S1 The reaction process of cystine in wool fiber during the treatment of protease catalytic system.

**Table S1** Machine washable performance of treated wool

Washing program		Size (cm)		Shrinkage percentage (%)		
		Width	Length	Width	Length	Felted area
Original		29.70	39.80	/	/	/
Relaxed	1×4G	28.60	39.10	-3.59	-1.68	/
	1×4N	29.50	38.40	3.30	-1.87	1.10
	2×4N	28.70	38.80	0.35	-0.94	-0.59
felted	3×4N	28.90	38.30	1.05	-2.21	-1.19
	4×4N	28.80	38.40	0.70	-1.79	-1.10
	5×4N	28.50	38.70	-0.47	-1.19	-1.65

**Table S2** Comparison of protease catalytic system processes with existing processes

		Wool shrink-proofing treatment		
		Conventional chlorination	Existing other enzyme treatment	This work
<b>Processes</b>	Efficient	☞	☞	☞
	Mild conditions	☞	☞	☞
	Easy operation	☞	☞	☞
	Continuous processing	☞	☞	☞
<b>Wool properties</b>	Excellent shrinkage resistance	☞	☞	☞
	Mild damage	☞	☹	☹
	<b>Industrialized</b>	☞	☞	☞
	<b>Eco-friendly</b>	☞	☞	☞

Note: ☞, ☹, and ☞ stands for good, fair, and poor, respectively.

**Table S3** Colorfastness

<b>Colorfastness</b>		<b>Untreated + Dyed</b>	<b>Treated + Dyed</b>
<b>Washing with soda</b>	Color change	4-5	4-5
	Wool staining	4-5	4-5
	Cotton staining	4-5	4-5
<b>Perspiration</b>	Color change	4-5	4-5
	Wool staining	4-5	4-5
	Cotton staining	4-5	4-5
<b>Water</b>	Color change	4-5	4-5
	Wool staining	4-5	4-5
	Cotton staining	4-5	4-5
<b>Ironing</b>	Color change	4-5	4-5
	Cotton staining	4-5	4-5
<b>Rubbing</b>	Dry	4-5	4-5
	Wet	4	4