

RAE2020

Sputtering Coating System for Sustainable Textiles and Fashion

Prof. Kinor Jiang

PolyU UoA 38

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Title: Sputtering Coating System for Sustainable Textiles and Fashion

Descriptor

Leading a team that has developed a sputtering coating technology with over HK\$12 million in ITF funding from the HKSAR government and sponsorships from the textile industries, Prof. Kinor Jiang has designed and launched an anhydrous system that uses roll to roll (RtR) magnetron sputtering to produce functional and decorative textiles and a metallising process of textiles for the production line.

The coated textiles feature a multicolored surface and have a soft handle with uniformly deposited nano-metallic films and continuous metallic patterns what is very first to integrate material science, engineering and manufacturing for new textile products without any discharge and pollution. The material properties of air permeability, water repellency, radiation shielding, and deodorization have been examined in the research work.

The developed RtR system is now being mass-used, and economically and environmentally efficient with commercial value. Coating technology and designs are now synthesized which has resulted in many achievements during the reporting period that include not only awards, scholarly publications, artwork exhibitions and fashion shows, but also textile products for the market.

Title: Sputtering Coating System for Sustainable Textiles and Fashion

Justification of double weighted output

The research of developing anhydrous coating technology on textiles involved cross disciplinary research work of both design and scientific research. Based on analysis of metallic thin nano-scale films, coating technologies, and engineering developments, the sputter coating theories and techniques were firstly developed and then tested on textiles through very extensive experiments for 5 years. A system using roll to roll sputter coating with mechanical, vacuum pump, controlling and stencilling pattern units was then designed and produced for manufacturing decorative and functional metallic textiles and a production scale system was finally developed after this research project commenced 6 years ago.

Prof. Kinor Jiang

Sputtering Coating System for Sustainable Textiles and Fashion

Leading a team that have developed a sputtering coating technology and that have received over HK\$12 million in ITF funding from the HKSAR government and sponsorships from the textile industries, Prof. Kinor Jiang has designed and launched an anhydrous system that uses roll to roll (RtR) magnetron sputtering to produce functional and decorative textiles and a metallising process of textiles for the production line .

The coated textiles feature a multicolored surface and have a soft handle with uniformly deposited nano-metallic film and continuous metallic patterns. It is the very first of its kind to integrate material science, engineering, and manufacturing for new textile products without any discharge or pollution. The material properties of air permeability, water repellency, radiation shielding, and deodorization have been examined in the research work.

The developed RtR system is now widely used, and it is economically and environmentally efficient with substantial commercial value. Coating technology and designs are now synthesized resulting in many achievements during the reporting period. These include awards, scholarly publications, artwork exhibitions, fashion shows, and textile products for the market.

What Constitutes the Research Output / Body of Work

- Developed and refined coating technology that allows commercialization of different designs on a wide range of different textiles. Developed an eco-friendly coating approach for metals and RtR system for textile production in 2014.
- The metallising process is now being mass-used, and not only economically and environmentally efficient but has commercial value. The sponsoring company, Royal Success (Asia) Ltd. which has licensed the technology has rolled out the technology to the market.
- Published more than 35 papers on sputter coated textiles in SCI journals. The developed RtR coating system for textile products is first introduced in journal in 2015. Four patents have been granted and seven patents are filed in PRC or USA. The first patent is registered in 2009.
- The resultant high performance metallised textiles are being incorporated into fashion collections by fashion designers, and museums and exhibitions have publicly showcased the work.

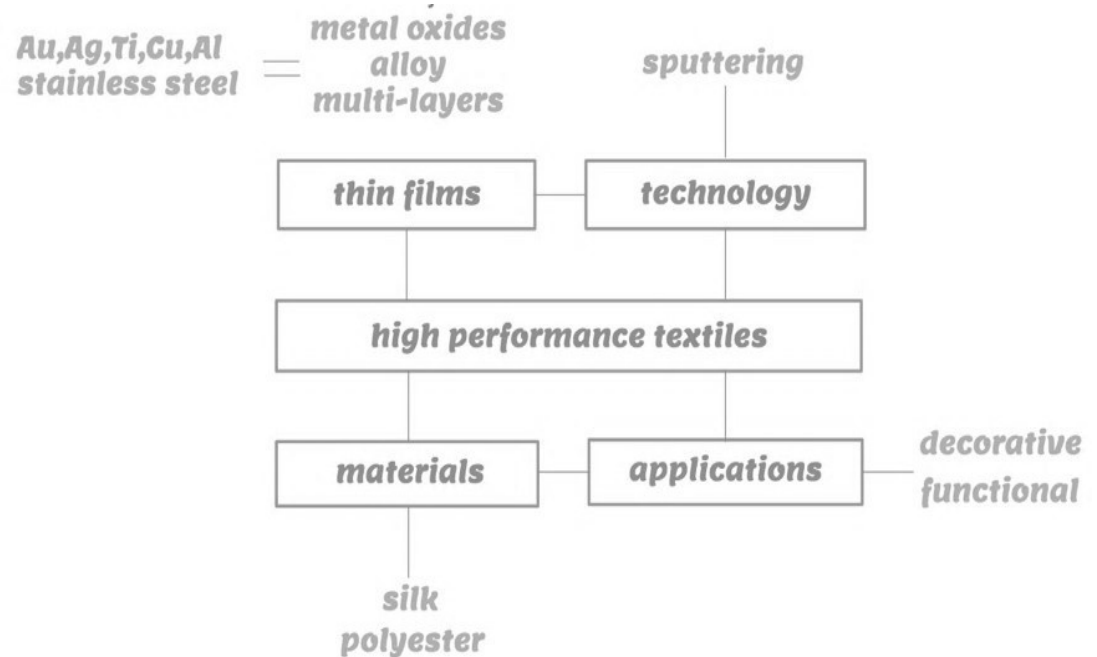


Fashion design using alloy coated silk Textile: Kinor Jiang; Fashion: Li Wei 2017

Research Scope

The RtR system is a non-aqueous coloration and finishing technology that does not create any pollution or discharge pollutants.

The technology therefore has production value for the sustainable development of the textile industry.



Research Questions

The research sets out to investigate

- How the development of a novel coating technology that uses sputtering can produce decorative and functional textiles;
- How the production of a unit of a pattern can be used in a coating system to produce RtR metallic textiles;
- How an RtR magnetron sputtering system can be developed and how multilayers of films can be produced for textile design;
- The functional properties of metallised textiles and the surface performance against the requirements of international specifications; and
- The establishment of an RtR magnetron sputtering system as a coating technology to produce value-added functional and decorative textiles and fashion items.

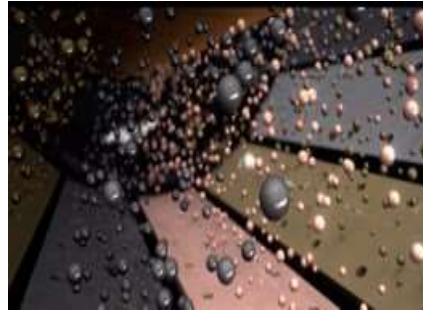
Research Methods and Materials

Metals, metal oxides and their alloys have been deposited onto the surface of fibres to provide a metallic appearance.

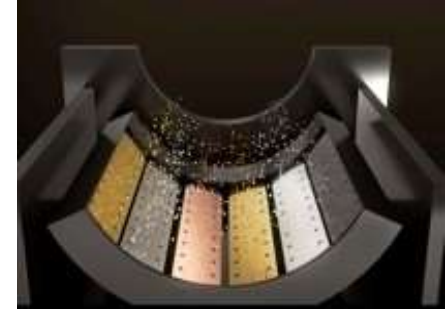
The metallic effects have different colours due to the following factors:

properties of the materials: i.e. type of fiber, weight of the material, thickness of the material surface, material structure, and pretreatment process used; type of film, i.e. metal, multi-metal, metal oxide or alloy;

and coating process, i.e. vacuum conditions, magnitude of the electric current, amount of voltage, and length of coating time.



Alloy



Nano particles



Oxide

Research Field and Key Works Referenced

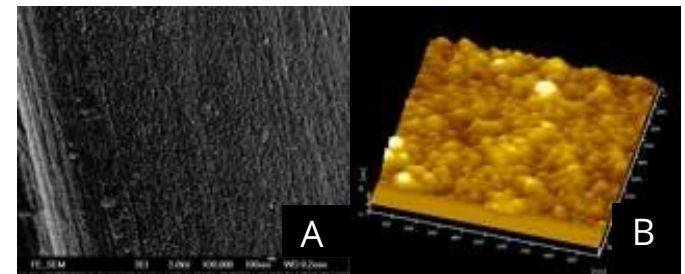
- The main principle behind the RtR system is based on sputtering coating technology and stenciling, which integrate winding and deposition by coating a variety of metal targets onto fabrics to produce metallic textiles.
- A preliminary study has found that after using the RtR system, the coated textiles have a soft handle and are uniformly coated with a nano-metallic film (thickness - 200 nm). The coating of metals, multi-layers of metals, alloys, and metal oxides provide textiles with decorative and functional performances.



Gold-sputtered silk



Gold-sputtered cotton



A

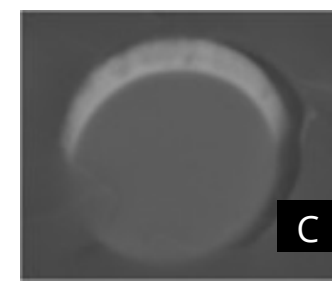
B



Gold-sputtered Polyester I



Gold-sputtered Polyester II



C

A. SEM image of coating
B. AFM image of coating
C. Coated fiber

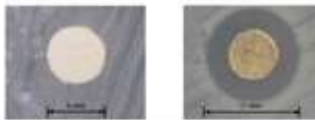
Performance of Coated Textiles

Material properties such as air permeability, water repellency, radiation shielding, and deodorization have been realized due to the deposition of a metallic film with ions. Sputtering technology has research prospects and production value for ecofriendly textile production, and as a zero-water textile coloration method, has great potential for replacing traditional dye processes that use hydrous dyes.

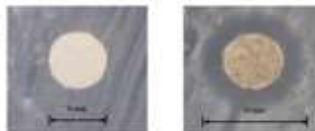
➤ Anti-bacterial properties

By AATCC 100-2004 Standard
E. Coli Bacteria decrement: 98.4-99.9
Staph. Bacteria decrement: 94.4-99.9

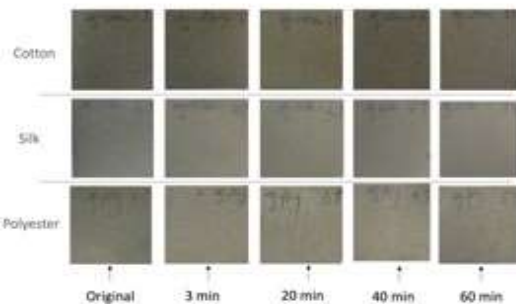
Inhibition zone with E. Coli on original silk fabric and silver-plated silk fabric



Inhibition zone with Staph on original silk fabric and silver-plated silk fabric



➤ Oxidation



Dyeing experiment under 180 °C (Specification: GB/T 13303-1991)

➤ Air-permeability

	Untreated	Silver coated
Silk	26.9	12.7
Cotton	10.7	10.4
Polyester	27.4	27.1

mean(cc/s/cm2) at 100Pa

➤ UV penetration

	Silk		Cotton		Polyester	
	Original	Silver coated	Original	Silver coated	Original	Silver coated
Average UPF	21.62	87.07	21.81	101.07	89.21	108.08
UPF rating	Good	Excellent	Good	Excellent	Excellent	Excellent

Water repellent property

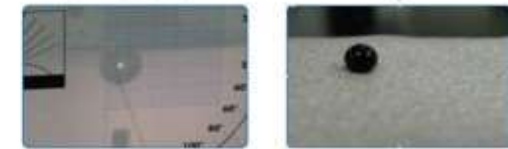
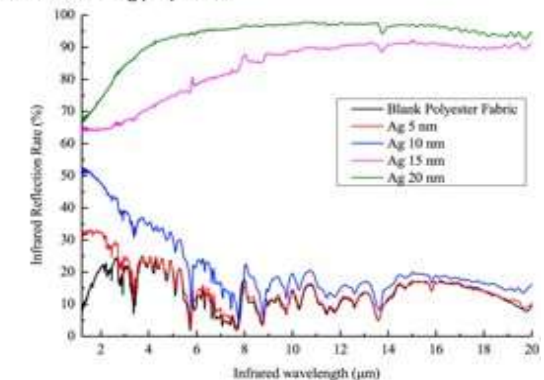


Image of water drop on silver-coated cotton fabric

	Untreated Absorb time (s)	Silver-coated Absorb time (s)	Silver-coated Contact angle (°)
Silk	< 1	> 30	124
Cotton	< 1	> 30	129
Polyester	< 1	> 30	129

➤ Heat shielding properties



Performance of Coated Textiles

Coated fabrics have specific properties, such as perspiration resistance, photo-thermal conversion, electromagnetic shielding and conductive. It has high bonding force between the coating and the substrate. It has been used in developments of functional and smart textiles.

Perspiration resistance

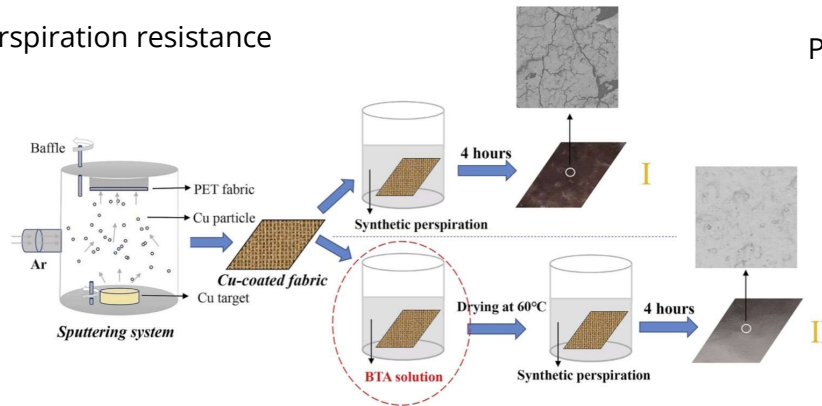
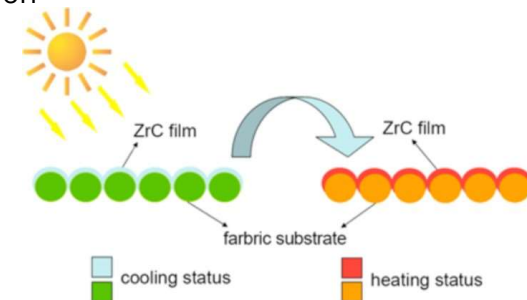
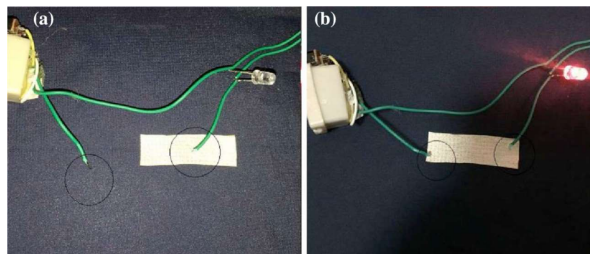


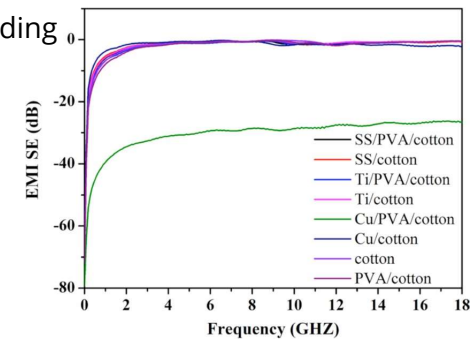
Photo-thermal conversion



Conductive



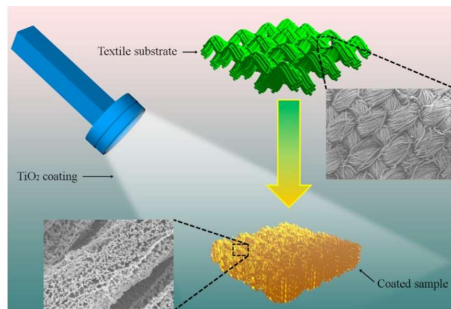
Electromagnetic shielding



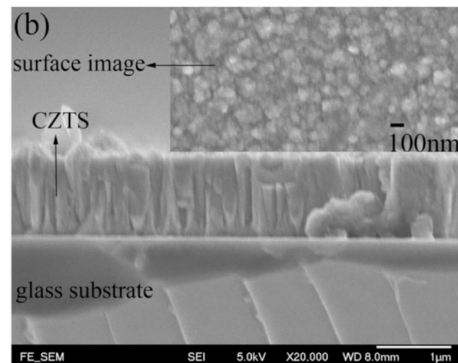
Performance of Coated Textiles

The TiO_2 film on the surface of textile materials by using magnetron sputtering shows sensitive surface-enhanced Raman scattering (SERS) and excellent flexibility, reproducibility and stability.

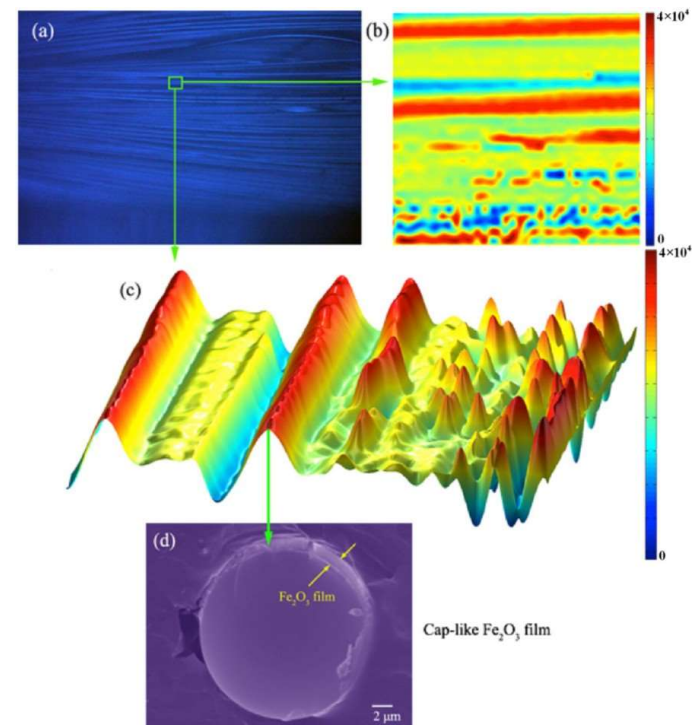
Porous TiO_2 thin film



Solar films



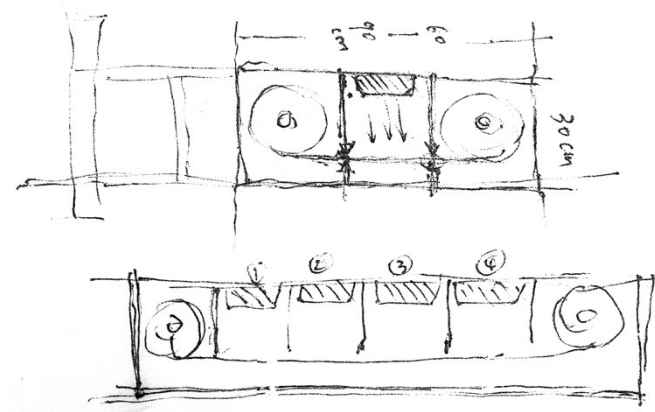
SERS



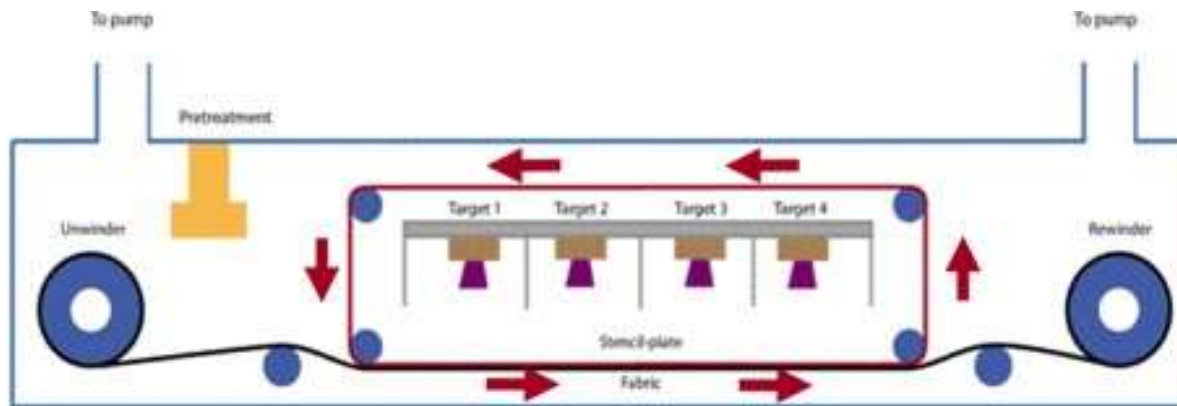
Development of RtR system by sputtering technology

Based on the results of a lab-scale device, the research investigated the physical process of an RtR system and produced a prototype for textiles with 4 targets, i.e., the RtR magnetron sputtering system.

The RtR system primarily uses stenciling, which integrates winding and deposition of metal targets onto the surface of fabrics for continuous metallic patterns.



Sketches of conceptual process for coating system for textile production applications

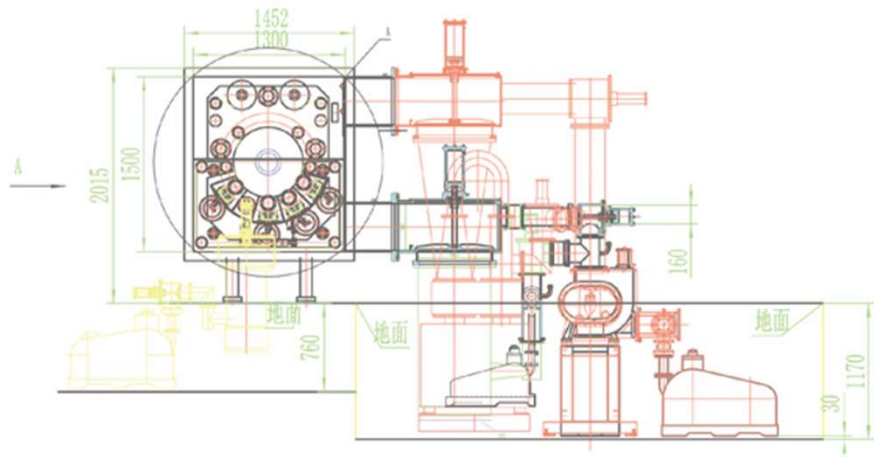


Schematic of RtR sputtering system with 4 targets and a stencil plate

Production plan of RtR magnetron sputtering system

A prototype of the RtR magnetron sputtering system for RtR processing has been developed as a new approach for producing large-size functional and decorative metallic textiles.

A prototype of the RtR system was funded by a sponsoring manufacturer, Royal Success (Asia) Ltd., in 2014.



- mechanical unit
- vacuum pump unit
- controlling unit
- stenciling pattern unit

Characteristics of coating system

A prototype RtR system was constructed to produce metallic textiles up to 70 cm in width at a coating speed of 0.3 m/min to 20 m/min.

The primary principle behind this system is based on sputter coating technology and stenciling, which integrate winding and deposition by coating a variety of metal targets onto fabric to produce superior metallic textiles.

The system primarily applies stenciling, which integrates winding and deposition to coat metal targets onto the surface of fabrics for continuous metallic patterns.



Trail production of the RtR system

Characteristics of coating system

- Functions:

shields electromagnetic (EMI) radiation and UV rays, and provides anti-bacterial, water repellency, and air permeability properties. Metallised textiles are excellent materials for smart clothing and accessories.

- Aesthetics:

Coats textiles with captivating painted hues. Resultant metallic patterns and sculpted appearance of the fabric are both graceful and artistic.

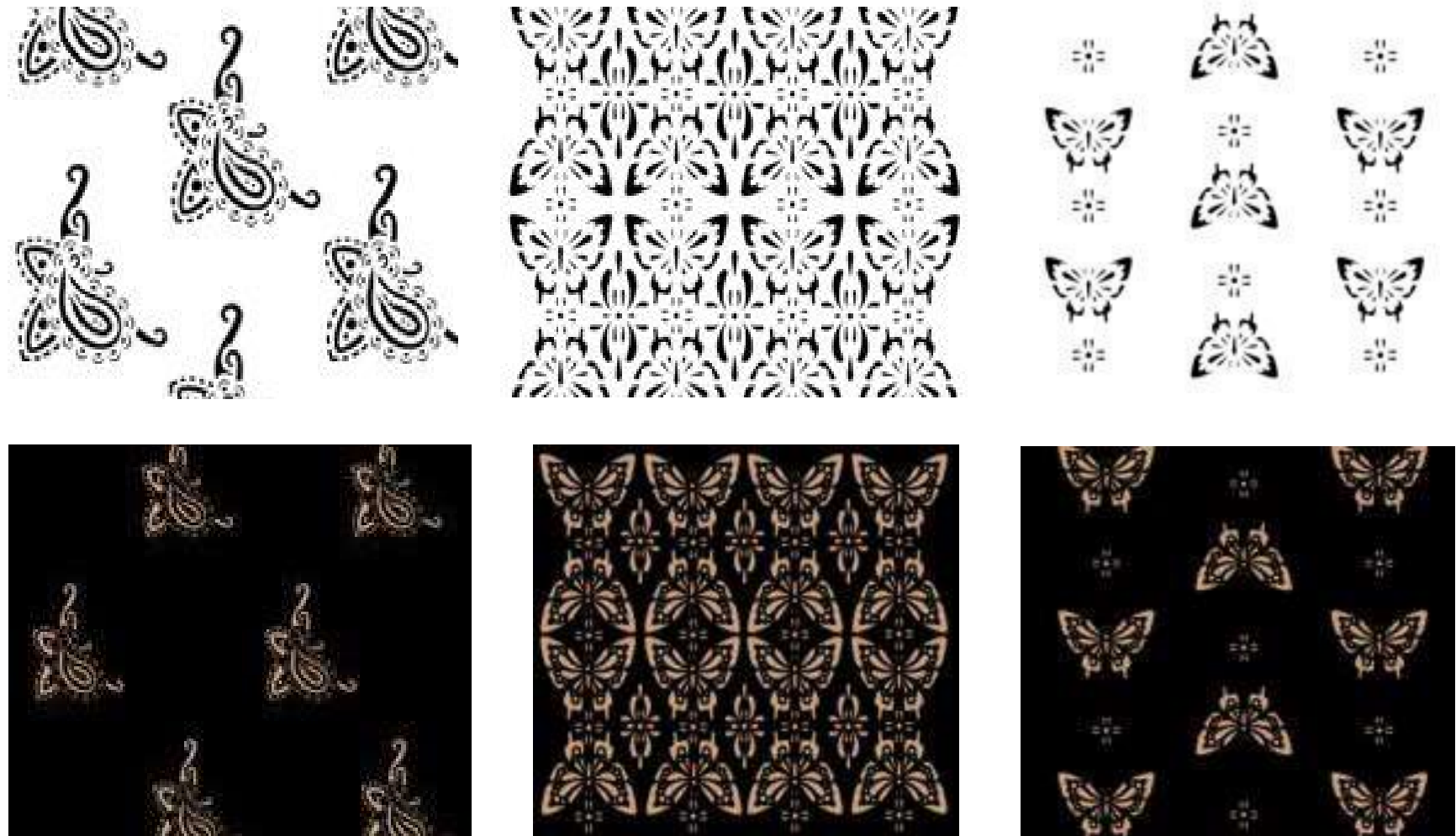
- Ecofriendly:

The anhydrous coating process does not discharge any pollutants and is a pioneering system for green coloration of textiles.



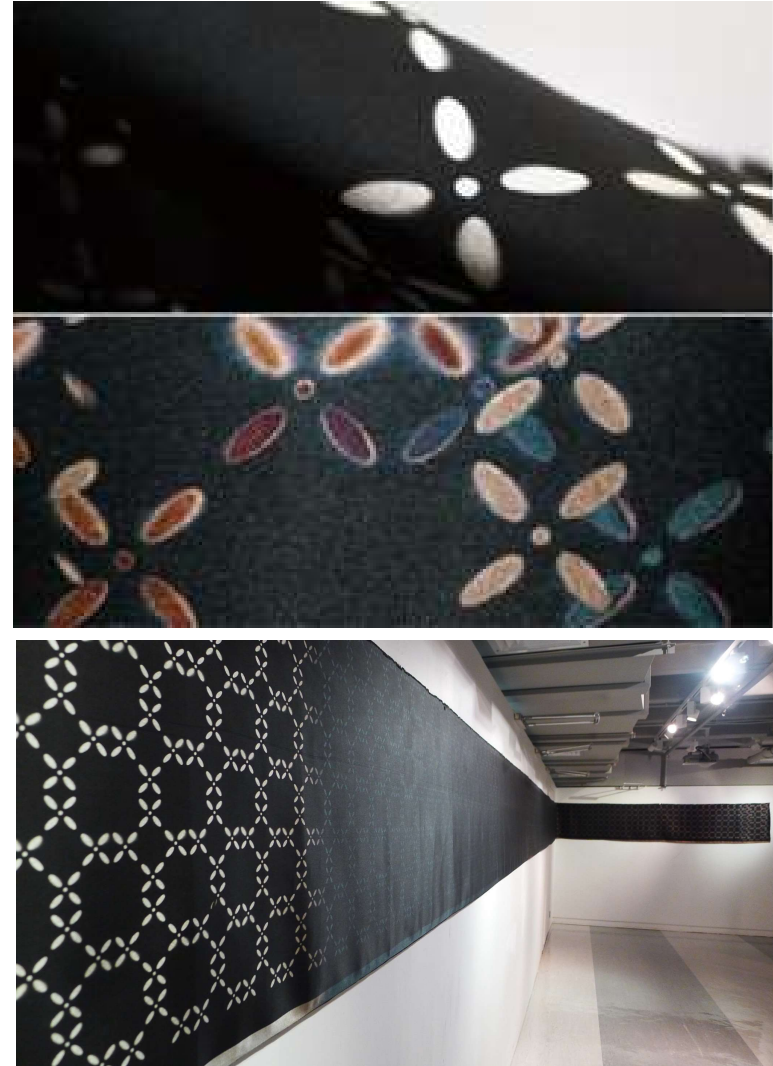
Stencils system

Patented design stencils for RtR system



Research outcomes / key findings / conclusions

- The RtR sputtering system produces coated textiles with functional material properties such as water repellence, anti-bacteria properties, good air permeability and soft handle in comparison to currently available metallic textiles.
- The coating of metals, multi-layers of metals, alloys, and metal oxides onto fabric produces coated textiles with various hues which depend on the different ratio of coatings, and differences in the amount of color transparency depend on the thickness of the films. Different metallic colors and patterns can be realized during the metallizing process at the same time.
- The production process is an environmentally-friendly technology that does not produce pollutants nor uses water. It is a sustainable approach to produce metallic fabrics without discharging any polluted water or injurants.
- The metallising process is now available for mass-use, and economically and environmentally efficient with commercial value. A sponsoring company has rolled out the technology to the market.



Appearance and handle

The work on textile coloration and finishing has research prospects and production value for the sustainable development of the textile industry and provides:

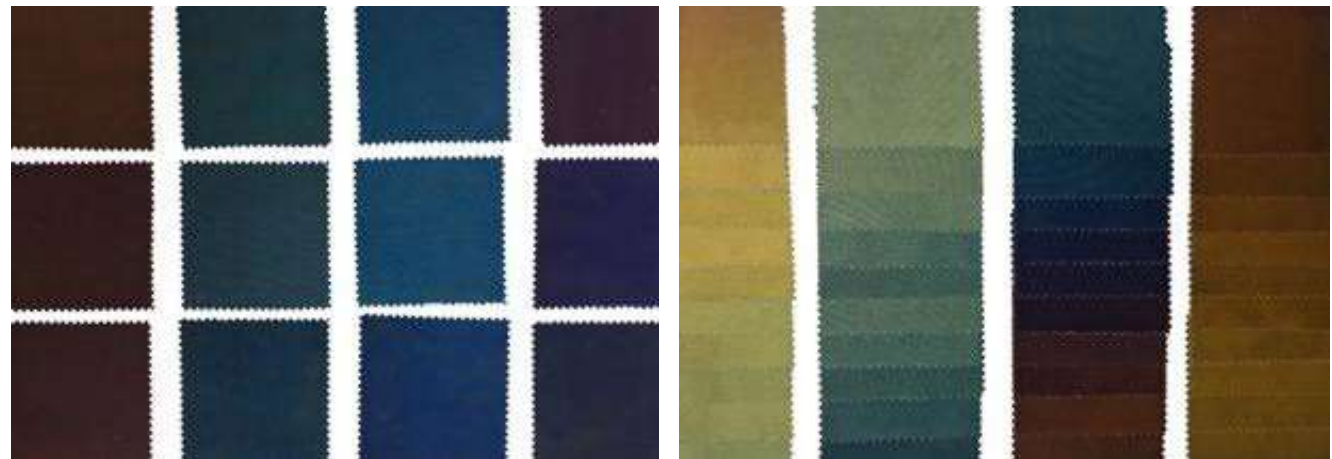
- A metallic appearance
- Repeatable patterns
- Soft handle / normal texture
- Draping



Colour



- After a fabric is coated with different metal targets with the use of the RtR system, functional material properties are imparted onto the textiles, such as water repellence, resistance to static and bacteria, shielding UV rays and radiation waves, and high air permeability. The handle and texture of the coated materials are greatly improved compared to the current laminated metallic fabrics available in the market.
- This research work on a non-aqueous sputtering technology is a potential new area of study in the field. The RtR system is pioneering work in green textile dyeing processes and finishing technologies which has outstanding research prospects and production value for the sustainable development of the textile industry.



Industrialisation

A large production system worth USD 1.2 million has been placed at Royal Success (Asia) Ltd in 2016.

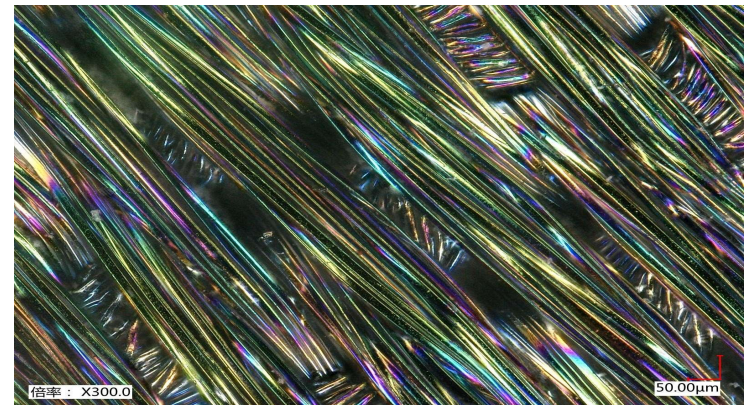
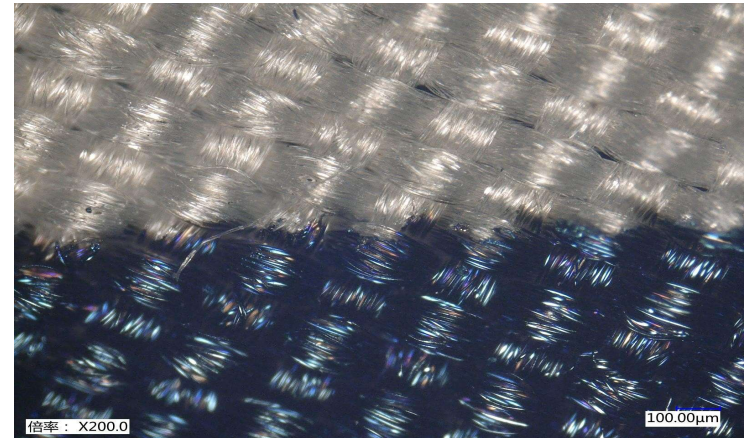
Creation of a new business: Royal Success (Asia) Ltd launched a new company in 2016 (Guangdong Rising Well Science & Technology Co., Ltd.) on the basis of this research with USD 1.5 million to further the industrialization and commercialization of the technology.

Royal Success (Asia) Ltd also formed Beijing Nano Coloration Science and Technology Limited with USD 7.2 million in 2017 on the basis of this research, in order to explore new technologies for textile products.



Production

- Compared to traditional dyeing and finishing techniques, the total cost of this technology is reduced by 23.5%, and the gross profit is increased by 16.6%. The same production output can be achieved with a 70% reduction in human resources.
- More than 600,000 square meters of textiles have been rolled out to the market. Statistics show that the developed anhydrous process have profited USD 3.2 million vs. traditional aqueous dyeing and finishing production methods as of July 2018. This means that 6,400 tons of water have been conserved and the company has saved about USD 12,000.
- This material generated annual sales of USD 2.8 million from 2017 to Sep 2019. The major buyers are domestic companies, and international fashion houses.



Coated poly pongee and iridescence effects (Further developments by the sponsoring manufacturer)

Dissemination and distribution of outcomes

Outputs in the research

- 8 prizes and awards; 2 works collected by V&A Museum, and China National Silk Museum; Metallised Textile Samples collected in Material Resource Centre
- 6 fashion shows using the coated materials, 4 solo exhibitions and 8 group exhibitions
- 35 papers published in SCI journals, 7 articles published in professional journals, and 14 keynotes or presentations in different events
- 4 patents granted, and 7 patents filed in China or USA
- Total 62 pairs of curtains produced for an elderly care home in Hong Kong to reduce harsh light, decrease temperature.
- The novel nature of the produced fabrics have had an impact on international fashion with 20 designers using the fabric in their collections.- - 4 Fashion design company and designers' studios have employed the metallised textile for their fashion collection such as YOUZ Clothing and EVENING in Beijing, Hometown in Guangzhou and RUI XU STUDIO, haute couture in London.

Award

"Academic Award", International Joint Exhibition of Defending Dyeing Art, 2019

"Bronze Award", The 2nd China International Dress Design Competition, 2018. "Excellent Prize", China Creation of Future Technology, 2018

"Excellent Paper", Cross-straits Conference on Textiles, 2018 "The 1st Design Power 100", China, 2017

"Bronze Award" in China International Fabrics Design, 2015

"Bronze Award" in Fabrics China Appraisal Entry Enterprise, 2015 "Silver Prize" in the 24th Jeanswest Fashion Award 2015

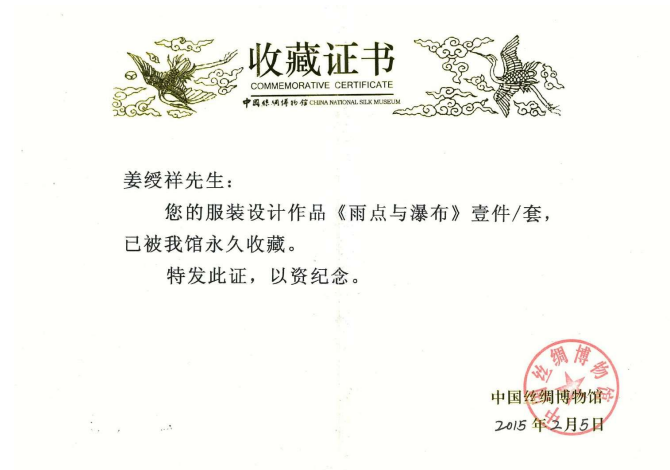


Museum Collection

- Kinor Jiang and Rui Xu
- Xianggui,
- Alloy coated gambiered canton gauze
- Victoria and Albert Museum



- Kinor Jiang
- 250g
- Stainless steel and titanium coated silk
- China National Silk Museum



- Metallised Textile Samples
- Textile design by Kinor Jiang
- Metal alloy coated silk, cotton, and polyester fabrics
- Material Resource Centre (MRC), Hong Kong

Polyu Textile Technology

Product name: Metallized Fabric

Fabric width: 75 cm

Composition: cotton, silk, or polyester



Awards

Silver Medal, 45th International Exhibition Inventions New Techniques and Products Geneva, 2012
Special Award, Romansen Association for Nonconventional Technologies, 2012
Bronze Prize, The Fashion China Textile Design Competition, 2015

Technology

Sputter Coating Technology
A chamber was evacuated and then backfilled with inert argon gas to a working pressure 1.8 x 10⁻⁴ Pa. Atoms might have been dislodged from the surface of metal target when kinetic energy struck the surface which was above the threshold of the typical 10-20 eV. The sputtered atoms and ions then condensed onto the substrate to form a thin film of coating material. By using magnetron sputtering technology, dense metal nano particles were emitted by electron power flow with a current intensity of 5.5 - 12 A. Multilayered alloy and metallic oxide films were thus deposited onto the silk fabric. Therefore, metallic effects with a film thickness that ranges from 10 - 200 nm could be imposed onto silk fabric.

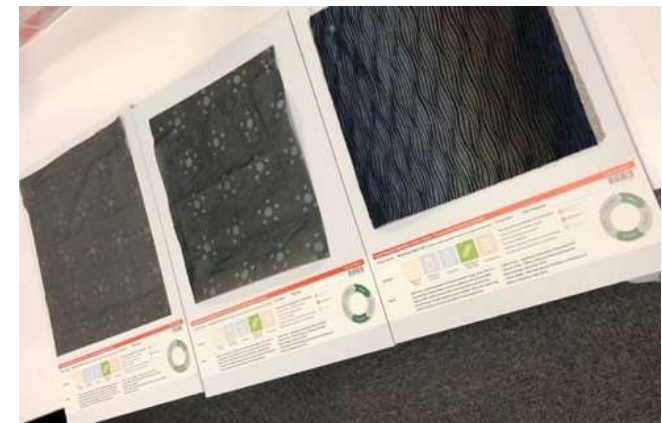
Company
Institute of Textiles and Clothing

Contact Details: The Hong Kong Research Institute of Textiles and Apparel
Tel: (852) 262 0180 Fax: (852) 2364 2727



cotton (Code: 61180755) / silk (Code: 61180756) / polyester (Code: 61180757)

*The MRC contains thousands of new and innovative materials from all over the world, collections from Material ConneXion New York, StylePark Germany, PolyU Eco-Material Archive (HK and PRD), Pantone color libraries and collections of local materials, manufacturers and suppliers. Material samples are continually added and updated.



Fashion Show

Hometown of gambiered canton gauze China Fashion Week, Beijing, 2018

Textile: Kinor Jiang; Fashion: Hui Jin Materials: alloy
coated gambiered canton gauze Tech: sputter
coating by RtR system

Manufacturer: Guangdong Rising Well Science and Technology Co. Ltd.



Hangzhou Global Qipao Festival China National Silk Museum, 2018

Kinor Jiang and Chen Yao

Materials: alloy coated blended silk and linen

Manufacturer: Guangdong Rising Well Science and
Technology Co. Ltd.



Technology Meets Arts: Metallized Textiles and Fashion Show Xiqiao, 2017

Textiles: Kinor Jiang
Fashion: Rui Xu, Wei Li

Materials: alloy coated silk,
polyester and gambiered
canton gauze

Manufacturer: Guangdong
Rising Well Science and
Technology Co. Ltd.



Fashion Parade, Rebelles - 2016 Festival of Extra Ordinary Textile Place de la Victoire, Clermont-Ferrand, France, 2016.

Textile: Kinor Jiang
Fashion: Rui Xu, Shu Sun
Materials: alloy coated silk,
polyester and gambiered
canton gauze



MÉDIATHÈQUE DE JAUDE

9, place Louis-Aragon

EXPOSITION CARNET DE COSTUMES DU CNCS DE CHRISTINE FLAMENT ①

• Jusqu'au 24 septembre

Le Centre national du costume de scène de Moulins conserve et valorise dix mille costumes de scène, provenant de l'Opéra de Paris, de la Comédie Française et de la Bibliothèque nationale de France. Christine Flament, auteure et illustratrice, a pu explorer, boîte d'aquarelle et pinceaux en mains, ces fabuleuses collections. Son *Carnet de costumes* vient de paraître aux éditions Bleu Asphalté. L'exposition présente une centaine d'aquarelles originales.

Tout public, du lundi au samedi,
de 10 h à 19 h

Le 3 septembre à 14 h 30 et à 16 h 30 :
visites guidées et commentées par
Christine Flament

Entrée libre

Renaissance – Festival of Extra Ordinary Textile (FITE), HS_Projets, France Metropolitan Museum of Manila, Manila, Philippine, 2015

Textile: Kinor Jiang

Fashion: Diane Sparks, Shu Sun, Rui

Xu, Guoxiang Yuan and Fanyu Tsang

Materials: alloy coated blended silk and linin

Manufacturer: Guangdong Rising Well Science and Technology Co. Ltd.



Kinor Jiang (Hong Kong)
in collaboration with Diane Sparks, Shu Sun, Tsang Fan Yu, Guoxian Yuan

Dr. Kinor Jiang is an Associate Professor in the The Hong Kong Polytechnic University. He is internationally renowned for his development of the metallized textiles. Dr Jiang's design works and art projects have been exhibited worldwide, including at Jim Thompson Art Center, Bangkok (2014), White Box Museum of Art, Beijing (2013), Museum of the Civilizations of Hue, City of Hue (2013); CAFA Art Museum, Beijing (2012); The China National Silk Museum, Hangzhou (2012); Bargoin Museum, Clermont-Ferrand (2012); Foshan Ancestral Temple Museum, Foshan (2012); The Dayton Art Institute, Dayton (2012); Avenir Museum Gallery, Fort Collins (2010); Bonington Gallery, Nottingham (2010); San Jose Museum of Quilts & Textiles, San Jose (2009); Belger Arts Center, Kansas City (2009); Museum of Siam, Bangkok (2009); Belger Arts Center, Kansas City (2009); Musée du Quai Branly, Paris (2008); Hong Kong City Hall, Hong Kong (2007); Korean Craft Museum, Cheongju (2003); and China National Art Gallery, Beijing (2001). His works have been part of the permanent collections of museums including the Fine Arts Museum of San Francisco (de Young Museums) and China National Silk Museum.

Evening (2015 S/S)
Soho Square, Beijing, 2014

Textile: Kinor Jiang Fashion
company: Evening
Materials: alloy coated silk and polyester
Manufacturer: Guangdong Rising Well Science and Technology Co. Ltd.



Exhibition

FLORENCE BIENNALE 2019

The XIIth Edition of the Florence Biennale (of Art and Design)

Fortezza da Basso, Florence

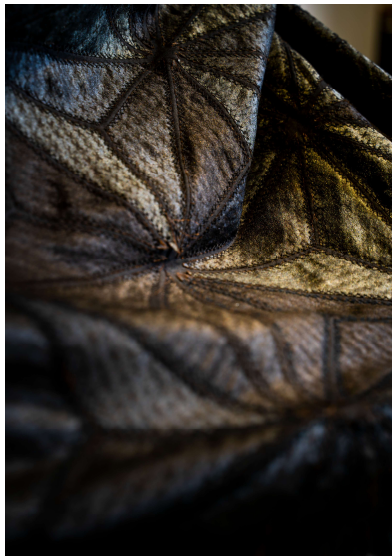
18 - 27 Oct 2019

Kinor Jiang: Cloth Landscape [Solo-exhibition]

The Fashion Gallery, Hong Kong

Apr – June 2019

<https://artexpress.artron.net/wapNewsShare/319940>
<https://mp.weixin.qq.com/s/ky--oa6pKJxm8Du--C7ebuCw>



New Era New Live - The 3rd China Design Exhibition, Ministry of Culture and Tourism of the People's Republic of China, Museum of Contemporary Art & Planning Exhibition, Shenzhen, Jan – Apr 2019.

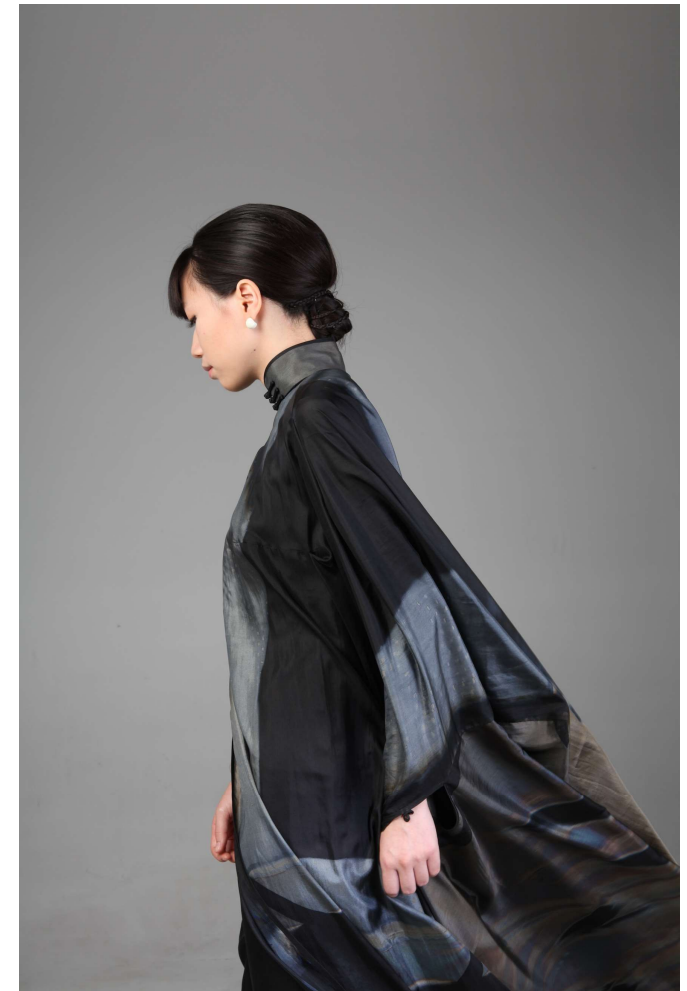
Textile: Kinor Jiang
Fashion: Rui Xu, Lu Yue,
Fan Wu, G.X. Yuan



<http://www.chinanews.com/wap/detail/pic/123000.shtml?from=timeline&isappinstalled=0> <https://mp.weixin.qq.com/s/mMBiK2Azlcb3ulHng6YO2Q>
<https://app.myzaker.com/news/article.php?pk=5c377d611bc8e09031000006>
http://www.hkcna.hk/content/2019/0111/738761_4.shtml

The Charm of a Great Power – Fashion Review for 40
Years Since the Reform and Opening-up
China National Silk Museum, Hangzhou, Oct – Dec
2018.

Textile: Kinor Jiang,
Fashion: Rui Xu
Materials: stainless steel coated silk
Tech: Sputter coating



International Shibori Art Exhibition Tama Art University Museum, Tokyo, 2018.

Designers: Kinor Jiang, Rui Xu, Fan Wu
Materials: alloy coated gambiered canton gauze
Manufacturer: Guangdong Rising Well Science and Technology Co. Ltd.



Exhibition

Surface Design in Fashion, Jill Stuart Gallery, Cornell University

Jan – Feb 2018 [Solo-exhibition]

<http://news.cornell.edu/stories/2018/01/textile-pioneer-kinor-jiang-designer-residence?from=timeline&isappinstalled=0>



This exhibition displays the glamorous design works by Prof. Kinor Jiang, a designer and artist with global reputation. The textiles are created by combining mechanical and chemical technologies and oriental aesthetics. Presented are his design works clearly demonstrating his unique artistic ideals and design concepts. Included in the exhibition is also a creative collection of works by some renowned and talented fashion designers, who work with Prof. Jiang and utilize materials he has developed. Individually and collectively, these clearly show that Prof. Jiang sheds fresh light on textile art design, creates broad possibilities with his innovative approach, and opens new path for the future of textile art with his exploratory and groundbreaking work.

Exhibition

80°C Before the Sun
Goes Down: Some
Like it Hot, Lethaby
Gallery, Central Saint
Martins, London, 2017

Catalogue: The design "Before the Sun Goes Down" presents in the catalogue, pages 8-9.
https://issuu.com/csmtime/docs/somelikehot_catalogue_highres_compr

CENTRAL SAINT MARTINS EXHIBITION: Some Like It Hot – Textiles and Jewellery, Written by Julia Nelson
<https://onin.london/central-saint-martins-exhibition-like-hot-textiles-jewellery/>
Some Like it Hot © By the author. Read Klimt02.net Copyright.
<https://klimt02.net/events/exhibitions/some-like-it-hot-lethaby-gallery>

Reported by media including BBC, Dezeen, IDOL, MayfairTimes, Sloane Square, AD, Disegno and UAL: Central Saint Martins
<http://www.arts.ac.uk/csm/whats-on-at-csm/lethaby-gallery/lethaby-gallery-past-exhibitions/lethaby-gallery-2017/>



Textile: Kinor Jiang,
Fashion: Rui Xu
Materials: alloy coated gambiered canton gauze
manufacturer: Guangdong Rising Well Science and
Technology Co. Ltd.

Ultraviolet Rays, Wearable Art of Shibori,
Centro de las Artes de San Agustín, Oaxaca,
Mexico, Nov 2016 – Jan 2017.

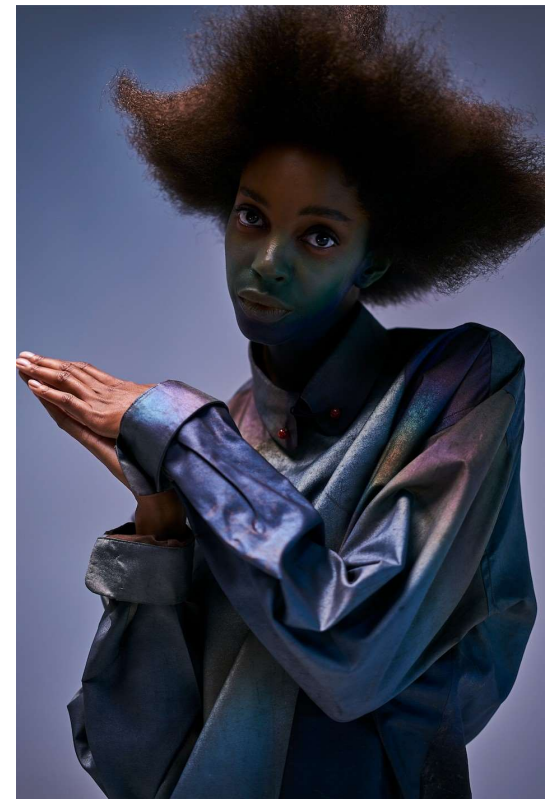
Textile: Kinor

Jiang, Fashion:

Rui Xu

Materials: alloy coated gambiered canton gauze

Manufacturer: Guangdong Rising Well Science and Technology Co.
Ltd.



The concept originality lies in its integration of coating deposition technology with different metals, such as Cu, Ag, Ti and stainless steel, to produce metallic textile products.

Beauty on Fire – for Zaha, Zaha Hadid Design Gallery, London, 2016.

Textile: Kinor Jiang,

Fashion: Rui Xu

Materials: alloy coated silk and polyester



The technique is the result of her collaboration with Kinor Jiang, a textile specialist at Hong Kong Polytechnic University and they have been fine-tuning it over the past eight years. The oxidation of the metal alloy on the fabric can create magical, painterly hues.

Lifestyle (/lifestyle) / Fashion & Luxury (/lifestyle/fashion-luxury)

<http://www.scmp.com/lifestyle/fashion-luxury/article/2007404/chinese-designer-rui-xu-mixing-fashion-art-and-having-zaha>

The design employed pure metals like silver and alloy, oxidation changed the colour slightly so the coating can appear almost in a golden hue creating an iridescent visual effect of a burning flame.

Luxuria Lifestyle United Kingdom

<http://www.luxurialifestyle.co.uk/beauty-on-fire/>

From Xuan to Blindness, Upper Gulbenkian Gallery, Royal College of Art, London, 2015.

Fashion: Rui Xu; Textile: Kinor Jiang



The audience will have the opportunity to look closely at the fine fabrics, which capture the splendid moment of metal burning, enabled by techniques of metal plating onto delicate natural textiles

PUBLIC | Royal College of Art

<http://www.rca.ac.uk/news-and-events/events/xuan-blindness-rui-xus-fashion-experience/>

Chinese Gambier Silk Fashion Design, China National Silk Museum, Hangzhou, 2014.

Designers: Kinor Jiang, Evening Yu

Materials: alloy coated gambiered canton gauze



mnēmonikos: Art of Memory in Contemporary Textiles, Jim Thompson Art Center, Bangkok, Thailand, 2014.

Designer: Kinor Jiang

Materials: stainless steel coated polyester



Paper

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Presentation

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- From Cloth to Clothing – Challenge and Opportunity of Design and Technology, Guangxi Arts Institute, Nanning, June 2019.
- Insight of Clothes – Leading Fashion by textile Design, Institute of Textile and Fashion, China Academic of Art, Hangzhou, Dec 2018.
- From Imagination to Realization, Figures of The Future – International Pattern Culture Interpretation Symposium, China Design Museum, The China Academic of Art, Hangzhou, Dec 2018.
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- From Cloth to Fashion, Deconstruction and Rebirth - 2018 Wuhan Fashion Art Festival, Hubei Institute of Fine Arts, Wuhan, June 2018.
- Experiment to Practice – Sustainable Fashion Design, Master Lecture Series: 6, The Guangzhou Academy of Fine Arts, Guangzhou, May 2018.



Presentation

- A developed anhydrous coating technology towards functional textiles, Textiles Technology x Sustainability Initiatives in Hotels, The Hong Kong Research Institute of Textiles and Apparel, Overseas Trust Bank Building, Hong Kong, May 2018.
- Coating Processes Towards Sustainable Textile and Fashion, Fiber Science and Apparel Design, Cornell University, Ithaca, Jan 2018.
- A nonaqueous coating process towards sustainable textile production, TELA (Textiles Empowering Lives Anew) ASEAN Conference, Philippine Textile Research Institute of the Department of Science and Technology, Philippines, Nov 2017.
- Developed RtR Colour Coating Technology, Culture Heritage in the 21th Century, Google, Asia Society Hong Kong Center, Tsinghua University, Beijing, July 2017.
- The Metallic Unequal Sound: Art and Fashion, University of Monterrey, Mexico, May 2016.
- Fascinating Metallic Textiles and Fashion, 9th International Shibori Symposium, China National Silk Museum, Hangzhou, Nov 2014.
- Surface Modification and Fashion Art, Textile Symposium, Jim Thompson Art Center, Bangkok, Thailand, Nov 2013.



Patent

Granted patents

- A pattern formation process for textile design through magnetron sputtering technology, PRC Patent: ZL 2009 1 0209008.8 (Prof. Kinor Jiang as first inventor)
- A roll to roll magnetron sputtering device for textile pattern generation, PRC Patent: ZL 201420582217. 3 (Prof. Kinor Jiang as first inventor)
- Coloration via magnetron sputter coating on textile fabric, PRC Patent: ZL 2014 1 0714517.7. (Prof. Kinor Jiang as first inventor)
- A yarn winding unit in the coating system, PRC Patent Filing No: 201720116759.5 Filing Date: 19 Sep 2017 (Prof. Kinor Jiang as first inventor)



**More than 60 patents have been granted or filed from the brother companies of the research sponsor manufacturer "Guangdong Rising Well Science and Technology Co. Ltd.", and "Beijing Nano Coloration Science and Technology Limited".*

Patent

Filed patents

- A method of vacuum coating process and system, PRC Patent Filing No: 201210321183.8 Filing Date: 26 Mar 2014. (Prof. Kinor Jiang as first inventor)
- Textile Waterless Dyeing Technology, PRC Invention Patent Filing No: 201510011780.4 Filing Date: 9 Jan 2015. (Prof. Kinor Jiang as first inventor)
- A non-hydrogen dyeing technology, U.S. Provisional Patent Filing No: HKRX01-1-USP, 2018; and PRC Invention Patent Filing No: 201510963484.4 Filing Date: 17 Dec 2015. (Prof. Kinor Jiang as the 2nd inventor)
- A method of forming pattern on the surface of a textile by a magnetron sputtering technique combined with laminating and laser engraving, PRC Invention Patent Filing No: 201610507104.0 Filing Date: 30 June 2016. (Prof. Kinor Jiang as the 1st inventor)
- A functional curtain fabric with anhydrous coating and its preparation method, PRC Invention Patent Filing No: 2017101662046 Filing Date: 20 Mar 2017. (Prof. Kinor Jiang as the 1st inventor)
- A pattern configuration process. PRC Invention Patent Filing No: 201710590485.8 (Prof. Kinor Jiang as the 1st inventor)
- Functional Curtain Fabric with Anhydrous Coating Layer and Method for Manufacturing Same, U.S. Provisional Patent Filing No: PAT-R-0117-WO-PCT, 2019 (Prof. Kinor Jiang as the 2nd inventor)
- Sample statement:

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