

Smart Textiles Utilize Stimuli Sensitive Materials

Esubalew Dessie*

Department of Textile Science and Engineering, Gezira University, Sudan, North Africa

Abstract

The application of stimuli-sensitive materials in smart textiles has revolutionized the field of wearable technology, offering exciting possibilities for functionality and interactivity. Stimuli-sensitive materials, also known as smart or responsive materials, are designed to respond to various external stimuli, such as heat, light, moisture, pressure, or electrical signals, by changing their physical or chemical properties. One of the key applications of stimuli-sensitive materials in smart textiles is in the area of temperature regulation. Thermo chromic materials, for example, change color in response to temperature fluctuations, allowing the fabric to visually indicate changes in body temperature or environmental conditions. This can be particularly useful in sportswear, where athletes can monitor their exertion levels or in medical garments, where changes in body temperature can be an important indicator of health.

Keywords: Thermo chromic materials • Stimuli sensitive materials • Medical garments • Smart textiles • Electro chromic materials

Introduction

Photochromic materials, which change color in response to light, are also widely employed in smart textiles. These materials can be utilized to create sun protective clothing that darkens when exposed to UV radiation, providing an additional layer of protection against harmful rays [1,2]. Similarly, electro chromic materials allow for the control of transparency or opacity in response to electrical signals, enabling the development of adaptive eyewear or privacy screens [3]. Moisture sensitive materials are another important category of stimuli sensitive materials used in smart textiles. They can absorb or release moisture, providing enhanced comfort and moisture management properties. Fabrics with moisture sensitive materials can dynamically adjust their breathability or water resistance based on environmental conditions or wearer's needs. Furthermore, the integration of stimuli sensitive materials with conductive elements, such as conductive fibers or threads, opens up possibilities for interactive textiles. By incorporating sensors and actuators, smart textiles can detect and respond to touch or gestures. For instance, a touch-sensitive fabric can be used to control electronic devices or adjust the settings of a wearable device with a simple touch or swipe [4].

Discussion

Additionally, the application of stimuli sensitive materials in smart textiles holds great potential in areas such as healthcare and rehabilitation. For instance, the integration of pressure sensitive materials in garments can enable the monitoring of body posture and movement, providing valuable data for physiotherapy or assisting individuals with mobility challenges [5]. This can aid in preventing injuries, tracking progress, and facilitating the recovery process. Smart textiles with stimuli sensitive materials can also contribute to the field of biometrics and personal monitoring. By incorporating sensors that can measure physiological parameters like heart rate, respiration, or skin conductance, these textiles can provide real time health monitoring, allowing individuals to track their well-being and detect any anomalies or signs of stress. Moreover, the ability of stimuli sensitive materials to respond to external stimuli can create immersive experiences in the realm of augmented reality and entertainment. Imagine a textile based gaming suit that vibrates or changes texture in response to in game events, enhancing the player's engagement and creating a more immersive gaming experience. Similarly, in the field of virtual reality, stimuli sensitive textiles can simulate tactile sensations, making the virtual world feel more realistic and enhancing the sense of presence [6].

*Address for Correspondence: Esubalew Dessie, Department of Textile Science and Engineering, Gezira University, Sudan, North Africa, E-mail: esubalewdesay@gmail.com

Copyright: © 2023 Dessie E. This is an open-access article distributed under the terms of the creative commons attribution license which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

Received: 01 June, 2023, Manuscript No. JTESE-23-100942; **Editor assigned:** 05 June, 2023, PreQC No. JTESE-23-100942 (PQ); **Reviewed:** 20 June, 2023, QC No. JTESE-23-100942; **Revised:** 01 August, 2023, Manuscript No. JTESE-23-100942 (R); **Published:** 09 August, 2023, DOI: 10.37421/2165-8064.2023.13.557

Conclusion

In conclusion, the application of stimuli sensitive materials in smart textiles has the potential to transform various industries and aspects of our daily lives. From healthcare and rehabilitation to personal monitoring, entertainment, and fashion, these materials offer exciting possibilities for functionality, interactivity, and customization. As technology advances and manufacturing processes improve, we can expect to see even more innovative and practical applications of stimuli sensitive materials in the future, further blurring the line between textiles and technology, furthermore, the application of stimuli sensitive materials in smart textiles also has significant implications in the realm of safety and protection. For instance, the integration of gas or chemical sensors into fabrics can enable the detection of hazardous substances in the environment, alerting the wearer to potential dangers. This can be particularly beneficial in industrial settings or emergency response situations, where real time monitoring of air quality is crucial for the safety and well-being of individuals. In the field of sports and fitness, smart textiles with stimuli sensitive materials can enhance performance and prevent injuries. By incorporating strain sensors that detect changes in muscle activity or body movements, these textiles can provide real time feedback to athletes or fitness enthusiasts, helping them optimize their training techniques, correct their posture, and reduce the risk of overexertion or strain related injuries.

Acknowledgement

None.

Conflict of Interest

None.

References

1. Textor, Torsten, Thomas Bahnners, and Eckhard Schollmyer. "Modern approaches for intelligent surface modification." *J Ind Text* 32 (2003): 279-289.
2. Salon, Marie-Christine Brochier, Makki Abdelmouleh, Sami Boufi, and Mohamed Naceur Belgacem, et al. "Silane adsorption onto cellulose fibers: Hydrolysis and condensation reactions." *J Colloid Interface Sci* 289 (2005): 249-261.
3. Vilcnik, Aljaz, Ivan Jerman, Angela Surca Vuk, and Matjaz Kozelj, et al. "Structural properties and antibacterial effects of hydrophobic and oleophobic sol-gel coatings for cotton fabrics." *Langmuir* 25 (2009): 5869-5880.
4. Palzer S, Ch Hiebl, K Sommer, and H Lechner, et al. "Influence of roughness of a solid surface on the angle of contact." *Chem Ing Tech* 73 (2001): 1032-1038.
5. Zhao, Haibo, Yingying Zhang, Philip D Bradford, and QianZhou, et al. "Carbon nanotube yarn strain sensors." *Nanotechnology* 21 (2010): 305502.
6. Lekawa-Raus, Agnieszka, Krzysztof KK Koziol, and Alan H Windle. "Piezoresistive effect in carbon nanotube fibers." *ACS Nano* 8 (2014): 11214-11224.

How to cite this article: Dessie, Esubalew. "Smart Textiles Utilize Stimuli Sensitive Materials." *J Textile Sci Eng* 13 (2023): 557.