Commentary

iMedPub Journals
http://www.imedpub.com

Journal of Medical Physics and Applied Sciences
ISSN 2574-285X

2020
Vol. 5 No.2:10

DOI: 10.36648/2574-285X.5.2.10

A Short Commentary on Preparation and Antimicrobial Activity of ZnO-NPs Coated Cotton/ Starch and their Functionalized ZnO-Ag/cotton and Zn(II) Curcumin/Cotton Materials

Issa M El Nahhal*

Department of Chemistry, Al Azhar University, Gaza, Palestine

***Corresponding author:** Issa M El Nahhal, Department of Chemistry, Al Azhar University, PO Box 1277, Gaza, Palestine, Tel: +972082135612; E-mail: issanahhal@hotmail.com

Citation: El Nahhal IM (2020) A Short Commentary on Preparation and Antimicrobial Activity of ZnO-NPs Coated Cotton/Starch and their Functionalized ZnO-Ag/cotton and Zn(II) Curcumin/Cotton Materials. Insights Med Phys Vol.5 No.2:10.

Received: October 7, 2020; **Accepted:** October 23, 2020; **Published:** October 30, 2020

Description

In their interesting paper entitled "Preparation and antimicrobial activity of ZnO-NPs coated cotton/starch and their functionalized ZnO-Ag/cotton and Zn(II) cur cumin/cotton materials". El Nahhal et al. [1] have performed a systematic literature about the use of nanometal and nanometal oxides coated cotton textiles to impart pathogenic bacteria by prescribing, dispensing and documenting in order to identify the main contributory factors involved. Due to the pathogenic bacteria resistance against classical antimicrobial therapies. New strategies are recently considered in order to combat bacteria resistance by using various types of inorganic nanometals and nanometal oxides particles coated cotton textiles to impart their antimicrobial activity. These materials showed high stability and antibacterial effectiveness even after intensive laundry regimes are employed in hospitals [2,3]. Special attention has been directed toward the use of antibacterial coated fabrics e.g. medical clothes to minimize the chance of nosocomial infections [4-6].

The authors have clearly highlighted the question of their research work in the light of previous reported works to keep improvements with respect of both the synthetic approaches, durability tests and antimicrobial activities to impart pathogenic bacterial. The main problem is that these materials suffer from leaching of the coated analytes from the surface of cotton textiles upon harsh washings processes. Therefore, the authors have tried to prepare stable nanometal oxide coated cotton materials with least leachable and more effective for elimination of microbial pathogens.

It has been reported that natural biodegradable and biocompatible biopolymers chemically linked with metal oxides have been recently employed to enhance the nanoparticles stability [7-9]. The use of the various agents e.g. enzymes, chemicals or binding agents as tools for activation of textiles may result in changes in the nature of the cotton fibres [10-12]. Harsh chemicals and enzymes or binding agent *in-situ* synthesis of metal oxides coated cotton are not recommended and should be avoided. Recently, different surfactants include: cationic anionic and non-anionic were used in the preparation [3]. Surfactants were used to stabilize nanometal and nanometal oxides by controlling their shape and size as encapsulated species [3]. The same authors have recently also used starched cotton instead for the first time as a new substrate for stabilizing the system by controlling the shapes and sizes of the nanometal oxides analytes [1]. This provides a new safe platform substrate in comparison with previous systems. There is a growing need to develop such environmentally friendly, green yet efficient synthetic approaches for synthesis of Ag nanoparticles. Therefore, eco-friendly agents like starch, glucose, chitosan etc. have attracted researchers as an alternative source for toxic chemicals [13-16]. Amongst them starch has become widely used as both reducing as well as capping agent because of the hydroxyl groups present in it.

They quantitatively analyzed the structural properties of coated cotton materials and used to impart their antimicrobial activity. The new materials showed high stability and antibacterial effectiveness even after several washing cycles. Further efforts and more focused strategies would be necessary to minimize the leaching of the coated analytes by controlling their shapes and sizes. Starch is one of the best, but we have to try with various simple experiment conditions to accomplish a stable nanometals and nanometal oxides coated cotton textile and to maintain high antimicrobial efficiently.

References

1. El-Nahhal IM, Salem JK, Anbar R, Kodeh FS, Elmanama A (2020) Preparation and antimicrobial activity of ZnO-NPs coated cotton starch and their functionalized ZnO-Ag/ cotton and Zn(II) curcumin/cotton materials. Scientific Reports 10: 5410.

© Under License of Creative Commons Attribution 3.0 License

2. Salat M, Petkova P, Hoyo J, Perelshtein I, Gedanken A, et al. (2018) Durable antimi-crobial cotton textiles coated sonochemically with ZnO nanoparticles embedded in an *in-situ* enzymatically generated bioadhesive. Carbohydr Polym 189: 198-203.
3. El-Nahhal MI, Elmanama AA, ElAshgar MN, Amara N, Selmane M, et al. (2017) Stabilization of nano-structured ZnO particles onto the surface of cotton fibers using different surfactants and their antimicrobial activity Ultrason. Sonochem 38: 478-487.
4. Khosravian S, Montazer M, Malek RM, Harifi T (2015) *in-situ* synthesis of nano ZnO on starch sized cotton introducing nano photo active fabric optimized with response surface methodology. Carbohydr Polym 132: 126-133.
5. Hong KH (2014) Preparation and properties of multifunctional cotton fabrics treated by phenolic acids. Cellulose 21: 2111-2117.
6. Zhang D, Chen L, Zang C, Chen Y, Lin H (2013) Antibacterial cotton fabric grafted with silver nanoparticles and its excellent laundering durability. Carbohydr Polym 92: 2088-2094.
7. Dhiman G, Chakraborty JN (2015) Antimicrobial performance of cotton finished with triclosan, silver and chitosan. Fashion Textiles 2: 13.
8. El Shafei A, Abou-Okeil A (2011) ZnO/carboxymethyl chitosan bionano-composite to impart antibacterial and UV protection for cotton fabric. Carbohydr Polym 83: 920-925.
9. Rosca C, Popa MI, Lisa G, Chitanu GC (2005) Interaction of chitosan with natural or synthetic anionic polyelectrolytes. 1. The chitosan–carboxymethylcellulose complex. Carbohydr Polym 62: 35-41.
10. Varaprasad K, Raghavendra GM, Jayaramudu T, Seo J (2016) Nano zinc oxide-sodium alginate antibacterial cellulose fibres. Carbohydr Polym 135: 349-355.
11. Ghayempour S, Montazer M (2017) Ultrasound irradiation based *in-situ* synthesis of star-like Tragacanthgum/zinc oxide nanoparticles on cotton fabric. Ultrason Sonochem 34: 458-465.
12. Petkova P, Francesko A, Perelshtein I, Gedanken A, Tzanov T (2016) Simultaneous sono-chemical-enzymatic coating of medical textiles with antibacterial ZnO nanoparticles. Ultrason Sonochem 29: 244-250.
13. Amin M, Anwar F, Ashraf-Janjua JRS, Iqbal MA, Rashid U (2012) Green Synthesis of Ag nanoparticles through reduction with solanum xanthocarpum L. berry extract: characterization, antimicrobial and urease inhibitory activities against Helicobacter pylori. Int J Mol Sci 13: 9923- 9941.
14. Gao XH, Wei LQ, Liqiao, Wang J, SheXu B (2011) Green synthesis of starch-stabilized Ag nanoparticles and their antibacterial properties. Adv Mater Res 236: 1945-1948.
15. Venkatesham M, Ayodhya D, Madhusudhan A, Babu NV, Veerabhadram G (2014) A novel green one-step synthesis of Ag nanoparticles using chitosan: Catalytic activity and antimicrobial studies. Appl Nanosci 4: 113-119.
16. Hiragond CB, Kshirsagar AS, Dhapte VV, Khanna T, Joshi P, et al. (2018) Enhanced anti-microbial response of commercial face mask using colloidal silver nanoparticles. Vaccum 156: 475-482.