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Easy Cleaning, Happy Life: A Review of the Hand-Washable Table

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Abstract: *The hand-washable table is one of the breakthroughs in furniture, addressing easy cleaning and maintenance while marrying adventurous design and technology. This review writes the salient features and the materials and construction concepts that have been employed in the manufacture of a robust yet sanitary table to be placed in some areas. The need for easy application in cleaning is expanded upon furniture-wise for high-use cases, infested with contamination and wear. This table is an adaptation of e-textiles into the functional and washable design. Some are larger and very portable, attempting to find that rare equilibrium of functionality and portability. Examples of additional aspects addressed include antimicrobial waterproof coatings which protect against moisture and microbial contamination. Cleaning and maintenance of the hand-washable table, including ease and efficiency, along with any particular instructions or special recommendations, are highlighted. This review provides an assessment of the table's performance and durability based on material use, environmental condition, and innovation concerning durability enhancement. Direct information on hand-washable tables is limited and thus draws perspectives from adjacent research on washable electronic textiles and wearable tech to help surmise some potential challenges and solutions to be proposed. In conclusion, the hand-washable table offers hope in the sector of furniture innovations in that it integrates clothing materials and technologies in providing a cleanliness-guaranteed, easy-care table top. Further research would, however, be needed to clarify areas regarding performance, durability, and cleanliness and maintenance instructions.*

Keywords: Hand-washable,Table,Hygiene,Self-cleaning,Furniture,E-textiles,Washable electronics ,Textile substrates, Embroidery manufacturing ,Supercapacitors, Triboelectric nanogenerators, Energy harvesting, Wearable devices

I. INTRODUCTION

1) Brief overview of the hand-washable table

Hand washing is extremely important in terms of personal hygiene and prevention of the transmission of diseases like influenza and other respiratory infections. Studies have proved that the right technique of hand washing can significantly lower the risks of infection1,2. The factors that influence the effectiveness of hand-washing include the method of drying. Wash dry with paper towels in combination with air dryers to greater efficacy with bacteria removal and less washroom contamination1. This is of utmost importance in healthcare settings, where hygiene is regarded as very important. Regular hand-creaming combined with good cleaning habits significantly diminishes the risk of this infection2. Different countries have varying guidelines and recommendations regarding hand hygiene practices using the common context depending on certain transmission dynamics, like before performing an invasive procedure or post-microbe contact3. Guidelines should be framed out so that they become easy enough to be adopted universally and bundled up satisfactorily to prove their cause and purpose of being an established standard of optimum care in medical practice and other medical settings.

2) Importance of easy cleaning in furniture

Self-cleaning technology is a fascinating and promising new field due to its application in furniture4. A self-cleaning surface is an important function for keeping the surface clean and stable under severe environmental conditions throughout extended periods of time. Daily usage and exposure to all kinds of contamination make this handy feature

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especially crucial in furniture. This property of cleaning under minimal assistance is very integral to design, contributing to aesthetics and hygiene. Interestingly, the research has already begun to develop synthetic leather with excellent liquiphobicity and self-cleaning properties5, particularly significant for furniture applications that can minimize the burden of cleaning furniture under highly heated conditions. The advancements made in material science can surely make cleaning and maintaining any furniture easy in high-use environments. Thus, it is clear that easy cleaning is a very vital aspect of designing and manufacturing furniture. It not only adds value to the user experience, but it also brings value to the sustainability and durability of the furniture product. The ever-growing demand for low-maintenance and hygienic furniture will call for the incorporation of self-cleaning technologies and varied innovative materials into furniture products.

II. DESIGN AND FEATURES

1) Material and construction

E-textiles or washable electronics are getting a lot of attention in recent times by the researchers in developing innovative approaches to build durable and flexible electronic circuits on textile substrates. Washable tablet construction makes liberal use of conductive yarns and suitably packaged components toward the wear of electronic embroidery (e-broidery) on the textile substrates6 .These techniques pattern conductive textiles using numerically controlled sewing or weaving processes to pave the way to computationally active textiles. The process should be compatible with conventional electronic components and design methods optimized for textile applications. A new manufacturing strategy termed additive functionalization and embroidery manufacturing produces textile-based supercapacitors (TSCs) on varying fabric types on location for power sources7 . This technique offers the unique opportunity to combine various electrode materials, device architectures, and pattern designs. Research is already being done into a washable and durable self-charging system consisting of asymmetric supercapacitors (ASCs) and triboelectric nanogenerators (TENGs) to harvest and store energy from human motion8. In conclusion, construction of the hand-washable tablet involves the interplay of flexible electronic circuits, power sources, and sensors connected to the textile substrates. E-textiles and the emergence of wearable and washable electronics are giving life to durable and usable wearable devices that address the dilemma of merging technology with everyday wear and textile.

2) Size and portability

Mobile electronic devices, such as tablets, are small and can thus be carried almost anywhere 9. However, as always, the demand for washable and durable devices brings with it its own set of challenges in respect of design and functionality. What emerges as a result is a washable, wearable, and durable self-charging system for human-movement energy harvesting and storage; it comprises asymmetric supercapacitors (ASCs) and triboelectric nanogenerators (TENGs)8. This system consists of a flexible silicon rubber-coated carbon cloth that is waterproof and soft, which makes it suitable for washable electronic applications. The device exhibits impressive flexibility and high stability with a capacitance of 234 mF cm-2 and a retention rate of 83 % after 5000 cycles. Whatever may lack in terms of specific mention with regards to washable tablets is made good in the context of lightweight design and portability for wearable electronics. However, mobility and functionality are traditional compromise challenges in the design of mobile devices10. In hand exoskeletons, remote actuation systems have been explored as a way to reduce weight on the weak limb to enhance portability11.

Such possibilities may be utilized in forming washable tablets, thus balancing size, portableness, and funality.

3) Special features

Waterproof coatings with antimicrobial properties are desirable features for hand-washable tablets, as they can shut out moisture interference and microbial contamination. Considerable research has been done to devise novel approaches for developing such multi-functional coatings. A novel eco- friendly waterproof coating consisting of organic and inorganic compounds has been developed and exhibited better tensile properties, water resistance, and flexibility 12. This coating consisting of styrene-acrylate copolymer, waterglass, and GGBS is reported to possess impressive mechanical properties with the added advantage of being eco-friendly because of not using cement. Antimicrobial properties could be achieved through several different methods. For instance, there is a variety of an active

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antimicrobial network coating consisting of nanophase-separated poly (ethylene imine) units and hydroxyl groups that have been loaded with silver nanoparticles into the PEI phase13 . It is meant to act as an antimicrobial silver ion release system with both contact-killing and microbe-repelling properties. In another method, ε-polylysine is deposited with a photosensitizer using dual-layer coatings, exhibiting very good antimicrobial properties against Gram-positive and -negative strains, including drug-resistant MRSA14 . In conclusion, many innovative ways can be used to combine waterproof and antimicrobial properties in coatings for hand-washable tablets, providing protection against moisture seepage and microbial contamination while ensuring durability and ability to withstand washing. Future research can optimize such coatings for specific tablet applications, enabling their effectiveness over a duration of time with the usual hand-washing practice.

III. CLEANING AND MAINTENANCE

1) Ease of cleaning

Based on the context provided, one cannot find much direct information available on aspects related to the cleaning and maintenance ease of hand washable tablets. Still, further insights may be derived from papers that discuss cleaning procedures for various surfaces and devices: Cleaning methods vary greatly in effectiveness15. discuss cleanability of different sink materials, they note that stainless steel left fewer bacteria post-clean than other materials, especially after wear and tear. Thus, the material and surface finish of a tablet could determine this easy cleanability. Cleaning processes are vital for effective hygiene, states 16. Indeed, the more poorly a cleaning process is controlled in a dental practice, the greater the risk of cross-infection. Their findings stress the importance of proper cleaning procedures, which might very well apply to tablet maintenance. Interestingly, Airey and Verran show that copper surfaces are prone to heavy soiling and bacterial retention after numerous cleaning cycles, unlike stainless steel, which seemed easy to clean. This scenario shows how intelligent material choice for a tablet could impact the cleanability in the long term17. In conclusion, yet again, while there are no specifications around hand washable tablets now, it'll likely boil down to the way the tablet has been made, the finish of the surface, and the way it has been cleaned. Proper cleaning procedures are very important in carrying out a good hygiene standard.

2) Effectiveness of cleaning

The context provides little substantive information regarding the cleaning efficacy of hand-washable tablets; however, relevant insights can be gleaned by combining findings from hand washing studies and surface cleaning: Hand washing with soap and water generally proves to be more effective against soil and microorganisms than waterless hand sanitizers18. This also means that washing a washable hand tablet with soap and water may be better than sanitizing wipes or sprays. The mechanical action of washing is of prime importance in removing the contaminants19.. Amazingly, however, there will be variability in cleaning efficacy depending on the type of microorganism present. For example, Gram-negative bacilli are often more removed than staphylococci20.. In other words, cleaning efficacy of such tablets may depend on specific types of the contaminant present on their surfaces. Those are general principles from hand and surface hygiene research that come into play with respect to how cleaning a tablet can be effective. However, cleaning efficacy may vary depending on the types of contaminants present. Further work on the cleaning of tablets is thus needed, as it will allow for generating specific guidelines regarding cleaning.

3) Special cleaning instructions or recommendations

The context gives no reliable information about any special cleaning instructions or recommendations for hand washable tablets. The papers mainly deal with hand hygiene practices within healthcare settings, general hand washing procedures, and their efficacy on disease-transmission prevention. However, from these articles, general principles can be surmised concerning the cleaning of hand washable tablets: 1. It is generally accepted that hand washing with soap and water will remove significantly more contaminants than alcohol-based hand rubs21. This may imply that it will be preferential to use soap and water for cleaning hand washable tablets, as well. 2. The duration of cleaning is important22. Typically, denture wearers will use soap and toothpaste for less than 2 minutes, and denture cleansing tablets are used for at least 5 minutes. This suggests a possible advantage for cleaning times longer than light scrubbing for the thorough cleaning of washable items.

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3.3 gives voice to the need for hand hygiene to have clear and easy-to-follow guidelines. Similarly, any cleaning instructions for hand washable tablets should be straightforward and easy to follow to allow for proper cleaning. While the context does not provide any specific recommendations on the issue of cleaning hand washable tablets, the general guiding principles of thorough cleaning with soap and water, proper duration, and clear instructions can be applied. To get the most accurate cleaning instructions, one should greatly refer to the specific guidelines given by the manufacturer for the hand washable tablet concerned.

IV. PERFORMANCE AND DURABILITY

1) Overall performance

The properties of self-cleaning coatings and materials that determine their application are performance and durability. The effectiveness of self-cleaning coatings may show great variability on the basis of materials used as a substrate and comparatively different environmental conditions. For example, the TiO2-based photocatalytic coatings that have been developed on cement-based substrates have shed light on performance and durability, specifically due to weathering processes23. Likewise, the durability of photocatalytic or lotus-effect-based self-cleaning materials was seen to be compromised under accelerated aging tests exposing them to UV radiation, rain, freeze-thaw, and thermal cycle variations24 . Nonetheless, some innovative approaches are making promising contributions to the durability and performance of self-cleaning materials. For example, the development of a superhydrophobic surface with excellent self-healing characteristics by the environmentally friendly approach on aluminum alloy shows outstanding durability, stability, and self-cleaning qualities under different conditions25. Further, TiO2-SiO2 composite photocatalysts and microsilica have been shown to slow down the deterioration of self-cleaning performance in cementitious systems during hydration and carbonation26. Self-cleaning materials display excellent potential; however, their long-term effectiveness and durability still remain challenges that require further research and development. The effectiveness of those materials highly depends on their substrate, environmental conditions, and formulation of the coating. The new and innovative approaches towards improving the durability and performance of self-cleaning materials include the development of self-healing surfaces, and composite photocatalysts among others

2) Durability and longevity

Durability and wearable life are the lifeblood of hand-washable electronic textiles (e-textiles) in terms of functioning and usability. Innovative treatments and encapsulation methods have been shown to greatly improve the stability and durability of conductive fabrics, particularly fabrics that incorporate polyaniline (PANI). In a study, it was determined that thermochemical treatment of polyester fabrics followed by PANI grafting enhanced the adhesion between the two, leading to Walpole conductivity (~10-3 S cm-3) even after 10 washing cycles27 . This method effectively improved the durability of conductive PANI fabrics, so they could withstand washing while maintaining electrical conductivity. When discussing hand-washable tablets or electronic devices integrated with textiles, the selection of encapsulation material is always critical. A study evaluating polydimethylsiloxane (PDMS) electronic packaging encapsulation for the washable applications of e-textiles determined that a 20:1 PDMS mixture served as the most suitable for them, being sufficiently hydrophobic and not swelling noticeably during washing machine trials28 . The e-textile samples in this study survived washing trials of approximately 10-15 washes without significant alteration, and microscopic inspection showed that the PDMS encapsulation remained robust and durable. As a gnomon indicates, even though dependable e-textiles are widely developed, much more advance still lies ahead. The recent developments in materials and encapsulation techniques have been extremely promising at improving the durability and long life of these artifacts in wearable electronics and smart textiles.

3) Any issues or concerns

Performance and durability are important subjects in developing hand-washable electronic devices, such as tablets. Even though there is little direct info about this in the particular context of hand- washable tablets, things can be inferred from adjacent research on washable electronic textiles and wearable devices. Durability is an important concern for washable electronic devices. Studies on washing machines have shown that certain durability tests can indicate performance deterioration and abrasion in products that were repeatedly stressed by cycles of cleaning29 .

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Hand-washable electronic textiles similarly face challenges in retaining their conductivity and functionality after several wash cycles. Nevertheless, creative solutions are proving effective in handling the concerns. For instance, a polydimethylsiloxane (PDMS)-conductive fabric composite report delivered little performance degradation after going through 15 wash cycles for RFID tag antennas30. Plus, thermochemical treatments were applied to render conductive samples of polyaniline (PANI) fabrics with stable conductivity for at least 10 wash sessions27. Interestingly, some research proved durable washable electronic textiles could have been attained simply through selection of an appropriate material and application of suitable fabrication techniques. For instance, composite yarns of carbon nanotube (CNT)-waterborne polyurethane (WPU) also demonstrated outstanding reliability while subjected to wash tests31 . The textile-based piezoresistive sensor also checked out the performance-grade spread from 90.3% right after five cycles of mechanical washing32. Finally, therefore, though hand-washable tablets have unique challenges, lesson analogously from that of washable devices proved both practical in an array of scientific conjectures.

V. CONCLUSION

1) Summary of key findings

There is little or no information on hand washable tablets in the papers provided, as the papers mainly deal with tablet splitting, disintegration, manufacturing, ergonomics, and related subjects. No mention of hand washable tablets or any such thing is made in the papers. With no good reference context, I cannot presumptively draw any conclusions about hand washable tablets from the literature provided; the papers deal with the principles governing all aspects of tablets but are totally devoid of mention of hand washable tablets. In that regard, more research on that latter subject will be needed to come up with a definitive answer. It is, therefore, quite apparent that the additional information in these papers is insufficient to reasonably draw any conclusions regarding the issue at hand.

REFERENCES

[1]. Huang C, Ma W, Stack S. The Hygienic Efficacy of Different Hand-Drying Methods: A Review of the Evidence. Mayo Clin Proc. 2012;87(8):791-798. doi:10.1016/j.mayocp.2012.02.019

[2]. Liu M, Ou J, Zhang L, et al. Protective Effect of Hand-Washing and Good Hygienic Habits Against Seasonal Influenza: A Case-Control Study. Medicine (Baltimore). 2016;95(11):e3046. doi:10.1097/MD.0000000000003046

[3]. Wendt C. Hand hygiene — comparison of international recommendations. J Hosp Infect. 2001;48:S23-S28. doi:10.1016/S0195-6701(01)90008-8

[4]. Dalawai SP, Saad Aly MA, Latthe SS, et al. Recent Advances in durability of superhydrophobic self-cleaning technology: A critical review. Prog Org Coat. 2020;138:105381. doi:10.1016/j.porgcoat.2019.105381

[5]. Gurera D, Bhushan B. Fabrication of bioinspired superliquiphobic synthetic leather with self- cleaning and low adhesion. Colloids Surf Physicochem Eng Asp. 2018;545:130-137. doi:10.1016/j.colsurfa.2018.02.052

[6]. Post ER, Orth M, Russo PR, Gershenfeld N. E-broidery: Design and fabrication of textile-based computing. IBM Syst J. 2000;39(3.4):840-860. doi:10.1147/sj.393.0840

[7]. Huang Q, Wang D, Hu H, et al. Additive Functionalization and Embroidery for Manufacturing Wearable and Washable Textile Supercapacitors. Adv Funct Mater. 2020;30(27):1910541. doi:10.1002/adfm.201910541

[8]. Huang Y, Wang L, Li X, Yang X, Lü W. Washable All-in-One Self-Charging Power Unit Based on a Triboelectric Nanogenerator and Supercapacitor for Smart Textiles. Langmuir. 2023;39(25):8855-8864. doi:10.1021/acs.langmuir.3c00909

[9]. Demidem A, Elmiligi H, Gebali F. Energy bugs in mobile devices: A survey. In: 2015 IEEE Pacific Rim Conference on Communications, Computers and Signal Processing (PACRIM). IEEE; 2015:513-517. doi:10.1109/PACRIM.2015.7334890

[10]. Park CB, Park HS. Portable 3D-printed hand orthosis with spatial stiffness distribution personalized for assisting grasping in daily living. Front Bioeng Biotechnol. 2023;11:895745. doi:10.3389/fbioe.2023.895745

[11]. Nycz CJ, Butzer T, Lambercy O, Arata J, Fischer GS, Gassert R. Design and Characterization of a Lightweight and Fully Portable Remote Actuation System for Use With a Hand Exoskeleton. IEEE Robot Autom Lett. 2016;1(2):976-983. doi:10.1109/LRA.2016.2528296

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[12]. Chang J, Li W, Wang D, Zhang Y. Effect of silicate modulus on tensile properties and microstructure of waterproof coating based on polymer and sodium silicate-activated GGBS. Constr Build Mater. 2020;252:119056. doi:10.1016/j.conbuildmat.2020.119056

[13]. Ho CH, Tobis J, Sprich C, Thomann R, Tiller JC. Nanoseparated Polymeric Networks with Multiple Antimicrobial Properties. Adv Mater. 2004;16(12):957-961. doi:10.1002/adma.200306253

[14]. Chen J, Wang W, Hu P, et al. Dual antimicrobial actions on modified fabric leads to inactivation of drug-resistant bacteria. Dyes Pigments. 2017;140:236-243. doi:10.1016/j.dyepig.2017.01.032

[15]. Holah JT, Thorpe RH. Cleanability in relation to bacterial retention on unused and abraded domestic sink materials. J Appl Bacteriol. 1990;69(4):599-608. doi:10.1111/j.1365- 2672.1990.tb01554.x

[16]. Bagg J, Smith AJ, Hurrell D, McHugh S, Irvine G. Pre-sterilisation cleaning of re-usable instruments in general dental practice. Br Dent J. 2007;202(9):E22-E22. doi:10.1038/bdj.2007.124

[17]. Airey P, Verran J. Potential use of copper as a hygienic surface; problems associated with cumulative soiling and cleaning. J Hosp Infect. 2007;67(3):271-277. doi:10.1016/j.jhin.2007.09.002

[18]. Foddai ACG, Grant IR, Dean M. Efficacy of Instant Hand Sanitizers against Foodborne Pathogens Compared with Hand Washing with Soap and Water in Food Preparation Settings: A Systematic Review. J Food Prot. 2016;79(6):1040-1054. doi:10.4315/0362-028X.JFP-15-492

[19]. Gibson H, Taylor JH, Hall KE, Holah JT. Effectiveness of cleaning techniques used in the food industry in terms of the removal of bacterial biofilms. J Appl Microbiol. 1999;87(1):41-48. doi:10.1046/j.1365-2672.1999.00790.x

[20]. Ojajärvi J. Effectiveness of hand washing and disinfection methods in removing transient bacteria after patient nursing. J Hyg (Lond). 1980;85(2):193-203. doi:10.1017/S0022172400063221

[21]. Savolainen‐Kopra C, Korpela T, Simonen‐Tikka M, et al. Single treatment with ethanol hand rub is ineffective against human rhinovirus—hand washing with soap and water removes the virus efficiently. J Med Virol. 2012;84(3):543-547. doi:10.1002/jmv.23222

[22]. Axe AS, Varghese R, Bosma M, Kitson N, Bradshaw DJ. Dental health professional recommendation and consumer habits in denture cleansing. J Prosthet Dent. 2016;115(2):183-188. doi:10.1016/j.prosdent.2015.08.007

[23]. Fregni A, Venturi L, Franzoni E. Evaluation of the Performance and Durability of Self- Cleaning Treatments Based on TiO2 Nanoparticles Applied to Cement-Based Renders and Boards. Coatings. 2023;13(6):990. doi:10.3390/coatings13060990

[24]. Diamanti MV, Luongo N, Massari S, Lupica Spagnolo S, Daniotti B, Pedeferri MP. Durability of self-cleaning cement-based materials. Constr Build Mater. 2021;280:122442. doi:10.1016/j.conbuildmat.2021.122442

[25]. Zhang Z, Xue F, Bai W, Shi X, Liu Y, Feng L. Superhydrophobic surface on Al alloy with robust durability and excellent self-healing performance. Surf Coat Technol. 2021;410:126952. doi:10.1016/j.surfcoat.2021.126952

[26]. Liu D, Kaja A, Chen Y, Brouwers HJH, Yu Q. Self-cleaning performance of photocatalytic cement mortar: Synergistic effects of hydration and carbonation. Cem Concr Res. 2022;162:107009. doi:10.1016/j.cemconres.2022.107009

[27]. Aizamddin MF, Mahat MM. Enhancing the Washing Durability and Electrical Longevity of Conductive Polyaniline-Grafted Polyester Fabrics. ACS Omega. 2023;8(41):37936-37947. doi:10.1021/acsomega.3c03377

[28]. Ojuroye O, Torah R, Beeby S. Modified PDMS packaging of sensory e-textile circuit microsystems for improved robustness with washing. Microsyst Technol. 2022;28(6):1467-1484. doi:10.1007/s00542-019-04455-7

[29]. Stamminger R, Tecchio P, Ardente F, Mathieux F, Niestrath P. Towards a durability test for washing-machines. Resour Conserv Recycl. 2018;131:206-215. doi:10.1016/j.resconrec.2017.11.014

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International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 1, December 2024

[30]. Simorangkir RBVB, Le D, Bjorninen T, Sayem ASMd, Zhadobov M, Sauleau R. Washing Durability of PDMS-Conductive Fabric Composite: Realizing Washable UHF RFID Tags. IEEE Antennas Wirel Propag Lett. 2019;18(12):2572-2576. doi:10.1109/LAWP.2019.2943535

[31]. Chen W, Cai M, Wu J, Ma H, Liu W, Xu F. Highly conductive, durable, washable, and scalable composite yarn for multifunctional wearable electronic applications. Compos Sci Technol. 2023;241:110115. doi:10.1016/j.compscitech.2023.110115

[32]. Zhao Z, Li Q, Dong Y, Gong J, Li Z, Zhang J. Washable Patches with Gold Nanowires/Textiles in Wearable Sensors for Health Monitoring. ACS Appl Mater Interfaces. 2022;14(16):18884-18900. doi:10.1021/acsami.2c01729