

THE DEVELOPMENT OF MULTIFUNCTION TEXTILE BY APPLICATION NANOPARTICLE OF METAL SYNTHESIZED USING ALGAE

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ABSTRACT

The background of the research conducted is that there are problems faced by the Indonesian nation with the outbreak of the Covid-19 pandemic requiring antiviral textile products, several textile industries require restrictions on the use of chemicals as well as requirements for multifunctional textile products with antibacterial, anti-UV and self-protective properties. -cleaning, the development of multifunctional textiles using environmentally friendly chemicals is a requirement that must be met. Then there is dependence on imported products, limitations, the high cost of textile materials with antibacterial properties that can be used for biomedical applications, and the need to develop textile materials with superior quality and multifunction, both as UV-protective, soil-release materials, and as antimicrobial substance is the background of this research. The aims of the research were to produce silver, copper and zinc nanoparticles prepared using algae and stabilizers, to produce an effective method for producing textile materials with optimum self-cleaning properties, and to develop new materials in the form of soil-release textile materials (anti-blood and water repellent) or self-cleaning textiles with antibacterial, antifungal and anti-UV properties through coating with silane compounds and metal nanoparticles as well as efforts to overcome the problem of metal nanoparticle waste being discharged into the environment. This research is planned to be conducted for three years. In the first year of the project, preparation of metal nanoparticles in the form of silver, copper oxide and zinc oxide nanoparticles were prepared using various types of algae (brown algae, red algae and green algae) using reflux, microwave and ultrasound methods, as well as characterization of metal nanoparticles using a UV-VIS, Particle Size Analyzer (PSA), FTIR tool, and antimicrobial activity test. In the second year of the project, the in situ and ex situ application of metal nanoparticles and the coating of silan compounds on various textile products (cotton, nylon, polyester, spandex, batik, leather) were carried out at research partners. The resulting products were further characterized to determine their applications including analysis of functional groups, thermal properties, mechanical properties, antimicrobial activity tests, and contact angle measurements. The output of the first year was the Registration of a Simple Patent on a Method for Making Nanoparticles Using Algae Extract as an Antibacterial Material, publication of an article in a Reputable International Journal on "Enhancement of Antimicroorganism Activity and Degradability of Pickle Skin by Modification with Nanoparticle Produced from Red Algae (*Gracilaria* sp.)" published in Central Asia and The Caucasus, as well as publication of several articles in the International Seminar Proceedings. The outputs of the second year are Simple Patent Registration of Nylon Fabric Modification Methods as Anti-Durable and Antibacterial Materials, publication of an article on "Enhancement of Antimicrobial Microcellulose of Bagasse by Modification with Silver Nanoparticles" in the *Rasayan Journal of Chemistry*, and participation in International Seminars and Webinars. This second year has produced 2 copyrights for reference books on "Microcellulose from Bagasse and Its Modification with Nanoparticles" and "Silver Nanoparticles from Preparations Using Banyan Leaf Extract and Their Application to Leather".

Kata Kunci: *Leather; nanoparticle of metal; polyurethane; multifunction textile; self_cleaning*