



Camouflage Textiles with Technical Coloration and Incorporating Illumination

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The demonstration and structure of thesis will cover the design, simulation, formulation for suitability of deceiving materials on textiles substances for high performance camouflage textiles; exposing the concealment and detection on spectral, chromatic and achromatic illumination for camouflaging. The evaluation of camouflage coloration will focus on standard assessments process in visible 400-700 nm and infrared ranges 700-2500 nm for concealment and detection of single and simultaneous background, adaptive environments. Present works on camouflage textiles will flow the illumination engineering of camouflage textiles for defence protection in multidimensional environments, materials and methodology for concealment of latest surveillance technology. Proposed research on camouflage textiles will exhibit multidimensional background environment of camouflage textiles such as woodland, desertland, Iceland, snowland, stoneland and marine. The reflectance and chromatic profile of camouflage treated textiles will be analysed with the reflectance profile of natural background. Germanium, aluminium, titanium dioxide, carbon black nanoparticles, metal oxide, carbon black pigment will be implemented for camouflage coloration as deceiving materials. The principle of camouflage coloration has been considered for reflection altering of target signature against of surrounding background. Experimentation of this thesis will judge the alternative way of camouflage coloration without color matching of natural background in addition of existing color matching principle with natural background. The potential outcome of the research is not only limited to visible ranges camouflage textiles in multidimensional background environments; but also infrared ranges for concealment and advancement of digital camera, hyperspectral camera and radar surveillance to overcome the present challenge of camouflaging. Primary method of deceiving materials



formulation is choosed for encapsulation into polyurethane solvent. Secondary method is an application of encapsulated deceiving materials on synthetic or cellulosic fabric such as polyamide 6, 6 (PA 6, 6), polyester and/or cotton fabric. The achievability and suitability of camouflage coloration on multidimensional background environments will be experimented by established methods of textile coloration such as coating, dyeing and/or printing. Camouflage treated fabric will be scanned by spectroscopic, microscopic and photographic illumination for suitability of materials and method and, chromatic and achromatic properties of camouflaging. Color measurement spectrophotometer, near infrared (NIR) spectrophotometer, Fourier transform infrared spectrometry (FTIR), scanning electron microscopy (SEM), digital camera, hyperspectral camera (HPC) are the proposed assessment methods for camouflage identification in terms of chromatic and achromatic characteristics of target signature (camouflage textiles) and multidimensional natural background. (Hossain, 2020; A. Hossain, 2021a, 2021b; M. A. Hossain, 2021a, 2021b, 2021c; Md. Anowar Hossain, 2022a, 2022b, 2022c; Md Anowar Hossain, 2022; Hossain, 2023a, 2023b, 2023c, 2023d, 2023e, 2023f, 2023g, 2023h)

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