



CAMOUFLAGE AND THERMAL PROTECTIVE SKIN COATING, WITH/WITHOUT DEET

OVERVIEW:

Currently fielded camouflage face paint in compact form provides passive camouflage protection in the visible and near-infrared (NIR) regions of the electromagnetic spectrum and also meets Soldier acceptability and safety criteria. Additional performance enhancements being addressed include protection from severe burns. Therefore, this Small Business Innovative Research (SBIR) project, concluding its second year of Phase II, was approved to develop, test and transition a coating technology to protect exposed skin from burns due to exposure from radiant heat. The goal is to increase the time to a second degree burn from 2 seconds to 4 seconds or greater, corresponding to a heat flux reduction from 40 to 15 kW/m², thereby providing additional time for Soldiers to respond. The number of casualties and the degree of burn injury can be reduced at a variety of heat fluxes by using these camouflage and thermal protective skin coatings.



DESCRIPTION:

Extensive development and testing of new thermally protective skin coatings were completed in Phase II. Coating components and other non-irritating barriers were carefully selected to simplify regulatory issues as well as meet design performance to reduce burn severity. These skin coatings were developed from low cost, non-irritating components and use Food and Drug Administration (FDA) approved pigments, which are commercially available and used in the cosmetic industry. This hypoallergenic camouflage skin coating product will be applied to exposed skin for the protection of military and first responders from flash fire and other intense thermal flux scenarios.



Several prototype formulations, pigmented (Green, Loam, Sand, White, and Black) with and without DEET, were developed in the Phase II SBIR effort. The testing accomplished during development included thermal analysis, calorimeter testing at several heat fluxes, estimations of times to second and third degree burns, ease of removal and skin irritation testing. The best formulations that at least doubled the time to a second degree burn at 40kW/m² exposures, while maintaining the NIR signature, were supplied in prototype squeezable, tube-like and pump containers from the two contractors. These samples were evaluated by Soldiers at Fort Drum, NY, in the summer of 2011, during regular field training to address the requirements as stated in the specification document, MIL DTL-32000 camouflage face paint. Evaluation criteria included, but are not limited to, odor, dispersion stability (separation of components – visual observation), ease of application and removal, spreadability, continuous coverage, sweat resistance and portability (potential package types). General areas of improvement included packaging, adhesion of cream to the skin, and skin irritation of insect repellent containing formulations. Odor was also mentioned but it was not considered a problem. The skin cream without DEET prototypes generally received better user assessments.

POINT OF CONTACT:

Warfighter Science, Technology and Applied Research (WarSTAR)

COMM: 508-233-4577/6481, DSN 256-4577/6481

E-MAIL: nati-amsrd-nsc-ss@conus.army.mil

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