

# STUDY OF THE ARTIFICIAL AGING OF WATERPROOF GARMENTS WITH TAPED SEAMS THROUGH PROLONGED EXPOSURE TO A COMBINATION OF UV RADIATION, ELEVATED TEMPERATURE, AND HUMIDITY

Milena L. Veliova<sup>1</sup>, Nikolai I. Stoichev<sup>2</sup>, Desislav P. Berov<sup>3</sup>,  
Tsvetanka J. Hristova<sup>4</sup>

<sup>1</sup>South-West University “Neofit Rilski”  
66 Ivan Mihaylov str.  
2700, Blagoevgrad

<sup>2</sup>Defense institute “Professor Tzvetan Lazarov”  
1592 Sofia, 2 Professor Tzvetan Lazarov Blvd  
E-mail: n.stoichev@di.mod.bg

<sup>3</sup>Defense institute “Professor Tzvetan Lazarov”  
1592 Sofia, 2 Professor Tzvetan Lazarov Blvd  
E-mail: d.berov@di.mod.bg

<sup>4</sup>Defense institute “Professor Tzvetan Lazarov”  
1592 Sofia, 2 Professor Tzvetan Lazarov Blvd.  
E-mail: ts.hristova@di.mod.bg

Waterproof garments are functional clothing designed to protect the wearer [1] from adverse climatic conditions. The fabrics used for waterproof garments incorporate either hydrophobic coatings or microporous membranes integrated into their structure [2]. In the production of waterproof clothing, one of the key aspects is the sewing process. Garments made from such fabrics require a specialized sewing technique, as the conventional method of joining textile materials is not suitable. When the needle penetrates the fabric during sewing, it compromises its functionality due to the small holes that are formed [3].

To preserve the functionality of waterproof garments, alternative methods to traditional sewing are employed. However, due to the specific conditions under which waterproof garments are used, the seams remain a vulnerable area where waterproofness can be compromised. Over time, the materials are exposed to a combination of factors—UV radiation, temperature fluctuations, and moisture—that induce physico-mechanical and chemical aging [4]. To assess the durability of such products, it is necessary to apply accelerated artificial aging methods, which allow the simulation of these processes under laboratory conditions [5].

The objective of the present study is to review existing scientific research in the field of artificial aging of waterproof garments with taped seams and to analyse the changes in their properties after exposure to a combination of UV radiation, elevated temperature, and humidity.

**Keywords:** *protective clothing, waterproof garment, waterproof seam, functional clothing, seam*