

Summary

This thesis This work is devoted to a comprehensive analysis of polymer protective coatings, with particular emphasis on their applications in military technology. The first part presents the characteristics of coatings, their classification, and their physicochemical properties, such as thickness, adhesion, hardness, and resistance to mechanical, chemical, and electromagnetic radiation factors. Specific types of coatings used in military technology are also discussed, including anti-corrosion coatings, IRR, RAM, CARC, and multispectral camouflage coatings.

The next section of the work provides a literature review, describing the history of polymer coating development, contemporary pro-environmental trends, and development directions particularly relevant to military applications. The objectives and scope of the research, which included the design, manufacture, and evaluation of the performance properties of camouflage coating systems modified with glass microspheres and carbon nanotubes, are defined.

The research methodology included substrate material preparation, coating application, and a wide range of laboratory and field tests. This paper presents the results of measurements of thickness, gloss, color, spectral reflectance characteristics, surface geometric structure, morphology, as well as resistance to abrasion, corrosion, and aging. Particular attention was paid to testing the effectiveness of camouflage using ground-based methods, including night vision.

The next step was to develop a predictive model for the paint application process using DoE methodology and implement a camouflage system. The paper discusses the selection of modifying additives, formulation development, analysis of experimental results, determination of application parameters and manufacturing technology, and implementation in production.

The paper concludes with conclusions and proposals for further research directions aimed at further improving the properties of coatings and their effectiveness in military applications.