

4th International Conference on

Condensed Matter and Materials Physics

August 16-17, 2018 | London, UK

Polymer composite materials and their application in designs of gas turbine engine

Sergei V Aliukov, Alexander V Kheruvimov and Alexander V Nikonov
South Ural State University, Russia

At present, there is a tendency to replace metals with nonmetals, including composite materials. More and more works are devoted to the creation and investigation of the structure and properties of high-temperature nonmetallic materials. Composites, being a heterogeneous anisotropic or quasi-isotropic system, combining the positive properties of components and possessing a complex of new properties not inherent in any of them, allow to substantially improve the basic characteristics of materials. The main requirement applied to the inlet housing of gas turbine engines made of polymer composite materials is the ability to withstand a high operating temperature. Modern polymer composite materials consist of reinforcing fillers and a polymer matrix. Reinforcing fillers can be made of: fiberglass, organic fiber, carbon fiber and are able to withstand the required operating temperature with ease. Thus, the task of selecting polymer composite materials for an input device is reduced to the selection of a polymer matrix connecting the reinforcing filler. This article analyzes the use of polymer composite materials in the details of gas turbine engines of aircrafts, the most promising components of polymer composite materials for manufacturing the input case of a helicopter gas turbine engine have been selected. Samples were made and mechanical tests of polymer composite materials were carried out. Based on the results of the research, the choice of the most promising polymeric composite material was made. The experimental studies carried out on the two most promising materials showed the advantages of a material that has a significantly larger temperature range of operation and has a large margin for modification. It is shown that heat-resistant materials with short-fiber filler can be a worthy replacement for aluminum alloy in the design of the input device.

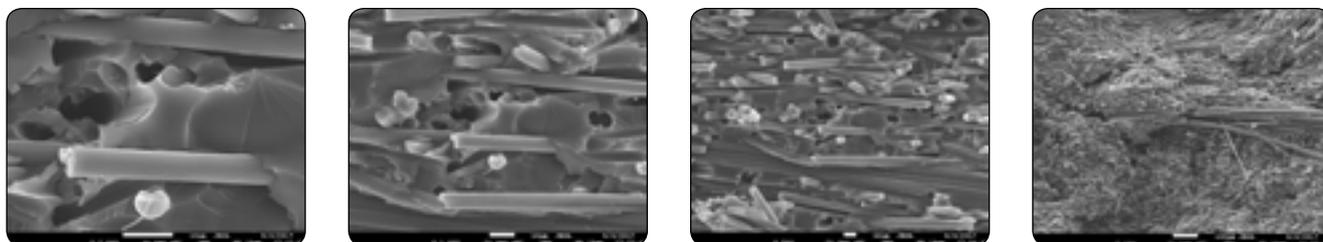


Figure 1: SEM images with different magnifications.

Recent Publications

1. Aliukov S (2018) Approximation of electrocardiograms with help of new mathematical methods. *Computational Mathematics and Modeling* 29(1):59-70.
2. Dubrovskiy A et al. (2017) Basic characteristics of adaptive suspensions of vehicles with new principle of operation, *SAE International Journal of Commercial Vehicles*. 10(1):193-203.

Biography

Sergei V Aliukov has been doing his scientific research in different areas of his activity, namely, in Engineering, Materials Science, Mathematics, and others. He has published 3 monographs and more than 100 papers. He has developed new methods of approximation of generalized and piece-wise functions and some physical and mathematical models of dynamical processes.

alysergey@gmail.com