

Processes of degradation in glass textolite subjected to discharge currents action

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ABSTRACT

The work describes degradation effects in the structure of shield-centering elements made of glass textolite. Experienced elements have been taken from operated medium-voltage (MV) surge arresters. As a result of acting inner partial discharges of diverse duration and power - the material underwent degradation of different degree of advancement. Using microscopic research techniques and EDS analysis, the authors found and documented changes of structure and chemical composition of the material surface, with the increasing degree of degradation. The textolite material binder - organic resin - was melted and charred. Glass textile support was more and more exposed. As a consequence, the amount of resin-building elements (mainly carbon) on the material surface was reduced. On the other hand, the amount of elements derived from the glass fabric (silicon and metals) was increasing. Further vital conclusion was that the consequence of degradation effect of the organic binder was creation of conductive carbon paths. Ultimately, this led to device malfunctions and its final damage. This means that the performance of the system's surge protection was in hazard.

BIOGRAPHY

Przemysław Ranachowski, born in 1969, was graduated in chemistry from Warsaw University. Since 1997 he has been working at the Institute of Fundamental Technological Research, Polish Academy of Sciences (IPPT PAN). The subject of his research are the properties, parameters of the microstructure, operational durability and degradation effects in ceramic and composite materials as well as light alloys with a wide range of applications. In 2001 presented his dissertation entitled "The use of the acoustic emission method to study the dynamics of polymorphic transformations of inorganic compounds". In 2013 presented his habilitation thesis "Ageing processes in electrotechnical ceramic materials". He was co-author of about 50 papers in wide recognized journals and belongs to the experienced specialists in the field of microscopic and ultrasonic inspection of different kinds of materials.



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- Research Interest: degradation processes in ceramic and composite materials