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B.10.4. Luminescence induite par plasma comme méthode de caractérisation des isolants synthétiques haute tension

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Résumé

Le propos de cet article est de présenter les possibilités que peut apporter la détection de la luminescence de surface des polymères isolants induite par mise en contact avec un plasma froid dans le domaine de l'étude des phénomènes de vieillissement des isolants synthétiques des câbles liés aux contraintes thermique et électrique. Pour le moment, cette technique est exploratoire et les résultats présentés ne sont que des résultats préliminaires dont l'exploitation ne peut être faite qu'au titre de simple tendance de comportement. Elle laisse entrevoir toutefois de larges possibilités d'application compte tenu de sa facilité de mise en oeuvre et de sa grande sensibilité à des modifications physiques, chimiques et structurales des polymères.

Introduction

The different stresses to which are submitted high voltage polymeric insulators during system operation can lead to drifts of physico-chemical properties of these materials versus time under stress. These stresses are of various origins. In the present study, we have payed our attention to thermal and electrical stresses. Thermal and electrical ageing are able to weaken the resistance of the material. Ultimately it can induced dielectric breakdown of the insulator. Although the number of techniques to highlight such modifications of material properties is great, the analysis appears very difficult. This can be explained by the fact that ageing entails modifications at a microscopic level.

B.10.4. Plasma-induced surface luminescence as a tool for high voltage synthetic insulation characterisation

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Abstract

The aim of this communication is to present the possibilities brought by the technique of plasma-induced surface luminescence in the study of ageing phenomenon of cable synthetic insulator linked to electrical and thermal stresses. For the moment, this technique is at a phase of development and presented results are only preliminary results. Large possibilities of applications can be foreseen considering the facility of its implementation and its great sensitivity to small physical, chemical and structural modifications of the polymer.

Chemical changes and microstructure modification of polymers can hopefully be studied by using a new technique called plasma-induced surface luminescence. Results that we present here are relative to preliminary tests realized on cross-linked polyethylene films directly cut from a cable. Further development are therefore necessary before we could consider this technique as a method of diagnosis but the presented results are encouraging.

Plasma-induced luminescence from a polymer surface

Luminescence activation needs the implantation of electrical charges at the surface of the polymer to be analyzed. One way of charging a polymer