The influence of titanium dioxide additive on the short-term DC breakdown strength of polyethylene

The effect of the addition of 1% by weight of titanium dioxide fine particles to low-density polyethylene (LDPE) on the short-term DC breakdown strength of the LDPE was investigated using direct and reverse polarity voltages. The samples used were cylinders of both plain and doped materials, with hemispherically tipped cylindrical electrodes completely embedded in the material, with a minimum gap length between the electrode tips of 0.25 mm. All tests were conducted at room temperature. Results indicate that, although the addition of TiO2 reduces the DC breakdown strength of the doped material if compared to the plain material, it significantly improves its DC reverse polarity characteristics. The doped material seems to be insensitive to the DC polarity reversals. The observed beneficial effect of the addition of TiO2 on the DC reverse polarity characteristics is attributed to the role of this additive in modifying the trapping levels in the polymer, and the consequent change in the space charge pattern in the doped material.

General information
State: Published
Organisations: Department of Electric Power Engineering, Department of Electrical Engineering, Danish Electrical Research Institute
 Contributors: Khalil, M. S., Henk, P. O., Henriksen, M.
Pages: 268-271
Publication date: 1990
Peer-reviewed: Yes

Publication information
Journal: IEEE International Symposium on Electrical Insulation. Conference Record
ISSN (Print): 0164-2006
Ratings:
BFI (2016): BFI-level 1
BFI (2015): BFI-level 1
BFI (2014): BFI-level 1
BFI (2013): BFI-level 1
ISI indexed (2013): ISI indexed no
BFI (2012): BFI-level 1
ISI indexed (2012): ISI indexed no
BFI (2011): BFI-level 1
ISI indexed (2011): ISI indexed no
BFI (2010): BFI-level 1
BFI (2009): BFI-level 1
BFI (2008): BFI-level 1
Original language: English
Electronic versions:
Henk.pdf
DOIs:
10.1109/ELINSL.1990.109753

Bibliographical note
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Source: orbit
Source-ID: 264650
Research output: Research - peer-review › Conference article – Annual report year: 1990