

8aA-1

September 8th (Mon.), <10:00-12:00>
Room 1

Helix-Sense Inversion of Poly(β -Phenethyl L-Aspartate) and Piezoelectricity.

○Kazuhiro TANIMOTO^{*,***}, Nariaki ITO^{**}, Kouki SHIBATA^{**}, Hidemine FURUYA^{**}, Akihiro ABE^{**}, Hisayoshi NISHIZAKI^{*}, Teruyuki TADA^{*}, Yuki SHIOMI^{*}, Munehiro DATE^{****}, Eichi FUKADA^{****} and Yoshiro TAJITSU^{*}

^{*}Graduate School of Engineering, Kansai University ^{**}Mitsui Chemicals, Inc.
^{***}Graduate School of Science and Engineering, Tokyo Institute of Technology
^{****}Kobayashi Riken

Abstract:

It has been reported that poly(β -phenethyl L-aspartate) (PPLA) exhibits irreversibly inversion from right-handed to left-handed helices in a solid state at 130-140 °C. On the other hand, semicrystalline chiral polymers show shear piezoelectricity. We measured the temperature dependence of piezoelectricity of PPLA film. As a result, PPLA showed shear piezoelectricity and sign inversion of the piezoelectric constant at approximately 140 °C. Our results imply that the orientation was maintained after the sign inversion.

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High Piezoelectric Performance of Poly(lactic acid) Film Manufactured by Solid State Extrusion and the High-order Structure by POM Observation

○Mitsunobu Yoshida*, Takayuki Onogi*, Katsuki Onishi*, Hideyuki Sugitani,
Teruyuki Tada, Syota Hayashi, and Yoshiro Tajitsu*

○*Mitsui Chemicals Inc., **Graduate School of Engineering, Kansai University

Abstract:

Recently, the development of a speaker, an actuator, and a pressure sensor using a piezoelectricity of uniaxial stretching poly(L-lactic acid);

(PLLA) film has been progressed. However, the shear piezoelectric constant d_{14} of a conventional uniaxial stretched PLLA film is 6-10 pC/N that is somewhat insufficiency for the applications. Therefore, further improvement is desired. In this study, we carried out solid-state extrusion (SSE) to stretch and orient poly(D-lactic acid) (PDLA) and verified its effects on piezoelectric performance. By using the SSE, we succeeded in increasing the piezoelectric constant of PLLA to 20 pC/N or more. And we investigated high-order structure of stretched film by polarization microscope (POM).

2014 Annual Meeting of The Institute of Electrostatics Japan
Hiroshima International University
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Recharge of Electret Filter after Washing by Triboelectric Charging

○Yasuhiro NAKAMURA, Yasutaka INANAGA and Koji OTA

Mitsubishi Electric Co. Advanced Technology R&D Center.

Abstract:

Privately held

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Thermal Endurance of Nano-composite Insulating Material of LDPE and Al₂O₃ Composed by Mixed Addition with Azobenzoic compound,

Yoshiaki Yamano

Faculty of Education Chiba University

Abstract:

This report presents test results after 5200 h from the start of thermal endurance test (aging test) on an insulating material of nano-composite with mixed addition. The nano-composite with mixed addition is originally designed to obtain a basic concept for long term endurance to electrical treeing deterioration. The composite was prepared by a mixed addition of azobenzoic compound and Al₂O₃ nano-particle into LDPE. 4'-hydroxyazobenzene-2-carboxylic acid ('hc_Ab') was chosen as a candidate. Experimental results with test materials before the aging test showed that an incubation time from voltage application to tree appearance was almost 1000 times longer than that for the base polymer under the constant applied voltage. The aging test is carrying out under temperatures, 87 °C, 92 °C and 95 °C. Properties for evaluations of the endurance are change in weight, resistance, UV absorption characteristics, etc. After 5200 h from the start of the aging, a change of 0.5 % in weight was detected with the mixed addition stored at 92 °C. By contrast, the change of the basic polymer was 2 %. The incubation time of the mixed addition was kept almost unchanged by the aging of

5200 h. The other properties with the test material were not reached to the end points which were defined in IEC 60216.

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Room 1

Study on the Dielectric Properties of Composite Materials

○Sou KATOU*, Hanzhi YANG*,Mahmudul KABIR*,Masafumi SUZUKI*Miyuki
OGISHIMA**,Akihisa KUWAKI**

*Graduate School of Engineering and Resource Science Akita University,
**SWCC SHOWA CABLE SYSTEMS CO., LTD.

Abstract:

This research work deals with the dielectric properties of composite materials made of epoxy resin and ZnO micro varistors. We measured the dielectric properties of the samples with temperature and humidity. The dielectric permittivity of the samples was calculated and we found that not only the temperature rise but also the change in humidity is responsible of changing the dielectric permittivity of the composite materials.

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Room 1

Making of Rotation Symmetry Equivalent Circuit Model and Study of Loss Current at Low Growth of Water Tree

○Yuta SAITO, Masafumi SUZUKI

Graduate School of Engineering and Resource Science

Abstract:

in this study, we made a rotation symmetry equivalent circuit model of XLPE sheet degraded by water tree. Since the number of partitions was well enough for the above sheet, the circuit can evaluate even the 10% growth of water tree in the sample. Gradually, the loss current at low growth of water tree was analyzed. As a result, the peak value of the third harmonic current was found increased but delay in phase was found at the same harmonic current with the growth of water tree.

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Corona Discharge from a Water Droplet without Disruption Formed at a Tip of a Capillary Tube

○Takuya Nakajima, Yoshio Higashiyama

Graduated School of Science and Engineering, Yamagata University

Abstract:

Current waveform of negative corona discharge from a water droplet formed at a capillary electrode consists of the repetitive pulse groups due to repetitive formation and disruption of a Taylor cone. Occurrence frequency of pulse group would be governed by vibrating frequency of a tip of the droplet during corona discharge. Disruption of the water droplet appears as the large first pulse in a pulse group. The waveform without the first pulse in each pulse group was accidentally observed. This means that and disruption of a Taylor cone would never occur. The vibrating frequency of a water droplet during corona discharge involving without the large first pulse in a pulse group varies from 2 to 4kHz and is strongly affected by an applied voltage, while corona discharge involving with the first pulse keeps almost constant at around 2kHz independent of the magnitude of applied voltage. Although the height of the corona pulse group without the first large pulse is a fourth or fifth of that with the first pulse, the charge quantity released during a single pulse group in both corona discharge aspect is almost the same.