Dielectric Dispersion and AC Conductivity of Acrylonitrile Butadiene Rubber-Poly(vinyl chloride)/Graphite Composite

Mansour, SA (Mansour, S. A.)[1,2]; Al-Ghoury, ME (Al-Ghoury, M. E.)[3];
Shalaan, E (Shalaan, E.)[2]; El Eraki, MHI (El Eraki, M. H. I.)[2];
Abdel-Bary, EM (Abdel-Bary, E. M.)[4]

Abstract

Dielectric properties and ac electrical conductivity of Acrylonitrile Butadiene Rubber-poly(vinyl chloride)/Graphite Composite were studied at different frequencies (10(2)-10(6) Hz) in the temperature range (298-423 K). The results show that the dielectric constant (epsilon'), dielectric loss (epsilon "), ac electrical conductivity (sigma(ac)) and, the electric modulus are strongly dependent on the frequency and temperature. The dielectric constant epsilon' increases with temperature and decreases with frequency, whereas the dielectric loss epsilon " displays a broad maximum peak whose position shifts with temperature to a higher frequency region. Cole-Cole diagrams have been used to investigate the frequency dependence of the complex impedance at different temperature and graphite loading. Interfacial or Maxwell-Wagner-Sillars relaxation process was revealed in the frequency range and temperature interval of the measurements, which was found to follow the Havriliak-Negami approach for the distribution of relaxation times. At constant temperature, the frequency dependence of ac conductivity was found to fit with the established equation sigma(ac)(omega) = A omega(s) quite well. The values of S for the investigated samples lie between 0.88 and 0.11. The conduction mechanism of ac conduction was discussed by comparing the behavior of the frequency exponent S(T) with different theoretical models. It was found that the correlated barrier hopping (C.B.H.) is the dominant conduction mechanism. (C) 2011 Wiley Periodicals, Inc. J Appl Polym Sci 122: 1226-1235, 2011

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Reprint Address: Mansour, SA (reprint author), King Abdulaziz Univ, Rabigh Fac Sci & Arts, Dept Phys, Jeddah, Saudi Arabia.
Addresses:
[1] King Abdulaziz Univ, Rabigh Fac Sci & Arts, Dept Phys, Jeddah, Saudi Arabia
[2] Suez Canal Univ, Fac Sci, Dept Phys, Ismailia, Egypt
[3] Sanaa Univ, Fac Sci, Dept Phys, Sanaa, Yemen
[4] Mansoura Univ, Dept Chem, Fac Sci, Mansoura, Egypt
E-mail Address: saidhsa@yahoo.com

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Electrical Properties and Transport Conduction Mechanism of Nitrile Rubber/Poly(vinyl chloride) Blend

Mansour, SA (Mansour, S. A.)[1] ; Al-Ghoury, ME (Al-Ghoury, M. E.)[2] ; Shalaan, E (Shalaan, E.)[1] ; El Eraki, MHI (El Eraki, M. H. I.)[1] ; Abdel-Bary, EM (Abdel-Bary, E. M.)[3]

Abstract

The current voltage characteristics of acrylonitrile butadiene rubber (NBR)/poly(vinyl chloride) (PVC) blends are studied as a function of sample temperature and PVC content. These samples showed ohmic behavior up to (225 V), after this value the behavior become SCLC (space charge limited conduction). The results obtained show that the charge carriers are generated by Richardson-Schottky emission from the electrode as well as from trapped ionic impurities at high fields. The activation energy of the prepared samples was calculated by using Arrhenius equation. (C) 2010 Wiley Periodicals, Inc. J Appl Polym Sci 116: 3134-3139, 2010

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Reprint Address: Mansour, SA (reprint author), Suez Canal Univ, Fac Sci, Dept Phys, Ismailia, Egypt.
Addresses:
[1] Suez Canal Univ, Fac Sci, Dept Phys, Ismailia, Egypt
[2] Sanaa Univ, Fac Sci, Dept Phys, Sanaa, Yemen
[3] Mansoura Univ, Fac Sci, Dept Chem, Mansoura, Egypt
E-mail Address: saidhsa@yahoo.com
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Thermal Properties of Graphite-Loaded Nitrile Rubber/Poly(vinyl chloride) Blends

Mansour, SA (Mansour, S. A.)[1]; Al-Ghoury, ME (Al-Ghoury, M. E.)[2]; Shalaan, E (Shalaan, E.)[1]; El Eraki, MHI (El Eraki, M. H. I.)[1]; Abdel-Bary, EM (Abdel-Bary, E. M.)[3]

Abstract

The thermal properties (thermal conductivity, thermal diffusivity, and specific heat capacity) of nitrite rubber (NBR)/poly(vinyl chloride) (PVC) blends were measured in the temperature range of 300-425 K. The incorporation of graphite into the NBR/PVC (30/70) matrix improved its thermal properties. Moreover, these properties slightly changed with the temperature. The thermal conductivity values of the prepared samples were compared with values modeled according to the Maxwell-Eucken, Cheng-Vachon, Lewis-Nielsen, geometric mean, and Agari-Uno models. The Agari-Uno model best predicted the effective thermal conductivity for the whole range of blend ratios and for the whole range of graphite contents in NBR/PVC (30/70)/graphite composites. (C) 2010 Wiley Periodicals, Inc. J Appl Polym Sci 116: 3171-3177, 2010

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Reprint Address: Mansour, SA (reprint author), Suez Canal Univ, Fac Sci, Dept Phys, Ismailia, Egypt.
Addresses:
[1] Suez Canal Univ, Fac Sci, Dept Phys, Ismailia, Egypt
[2] Sanaa Univ, Fac Sci, Dept Phys, Sanaa, Yemen
[3] Mansoura Univ, Fac Sci, Dept Chem, Mansoura, Egypt
E-mail Address: saidhsa@yahoo.com

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Mechanical and Oil Resistance Characteristics of Rubber Blends Based on Nitrile Butadiene Rubber

Omran, AM (Omran, A. M.);
Youssef, AM (Youssef, A. M.);
Ahmed, MM (Ahmed, M. M.);
Abdel-Bary, EM (Abdel-Bary, E. M.)[1];
Hellipolis, RTL (Hellipolis, R. T. L.)

Abstract

Different rubber blends based on nitrile butadiene rubber, NBR (N3980-39% acrylonitrile) have been prepared to get a product with high oil resistant and good mechanical properties. The obtained mixes included NBR, chloroprene rubber (CR) and polyvinyl chloride (PVC). The ratio of each component (NBR, CR and PVC) as binary or ternary blend system has been varied and the corresponding vulcanizing systems have been carefully selected. It has been found that the type of rubber and the composition of blends markedly affect their oil resistance. In contrast, the type of crosslinks and crosslinking density slightly affect the oil resistance of the corresponding vulcanizates.

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Reprint Address: Abdel-Bary, EM (reprint author), German Univ Cairo, New Cairo City, Egypt.
Addresses:
[1] German Univ Cairo, New Cairo City, Egypt
E-mail Address: elsayed.abdelbary@guc.edu.eg
Publisher: DR ALFRED HUTHIG VERLAG GMBH, POSTFACH 10 28 69, D-69018 HEIDELBERG, GERMANY
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Preparation and In Vitro Evaluation of New pH-Sensitive Hydrogel Beads for Oral Delivery of Protein Drugs

El-Sherbiny, IM (El-Sherbiny, I. M.)[1,2];
Abdel-Bary, EM (Abdel-Bary, E. M.)[2];
Harding, DRK (Harding, D. R. K.)[1]

Abstract

New biodegradable pH-responsive hydrogel beads based on chemically modified chitosan and sodium alginate were prepared and characterized for the controlled release study of protein drugs in the small intestine. The ionotropic gelation reaction was carried out under mild aqueous conditions, which should be appropriate for the retention of the biological activity of an uploaded protein drug. The equilibrium swelling studies were carried out for the hydrogel beads at 37 degrees C in simulated gastric (SGF) and simulated intestinal (SIF) fluids. Bovine serum albumin (BSA), a model for protein drugs was entrapped in the hydrogels and the in vitro drug release profiles were established at 37 degrees C in SGF and SIR The preliminary investigation of the hydrogel beads prepared in this study showed high entrapment efficiency (up to 97%) and promising release profiles of BSA. (C) 2009 Wiley Periodicals, Inc. J Appl Polym Sci 115: 2828-2837, 2010

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Reprint Address: Harding, DRK (reprint author), Massey Univ, Inst Fundamental Sci, Dept Chem, Palmerston North, New Zealand.
Addresses:
[1] Massey Univ, Inst Fundamental Sci, Dept Chem, Palmerston North, New Zealand
[2] Mansoura Univ, Polymer Lab, Dept Chem, Fac Sci, ET-35516 Mansoura, Egypt
E-mail Address: d.r.harding@massey.ac.nz
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