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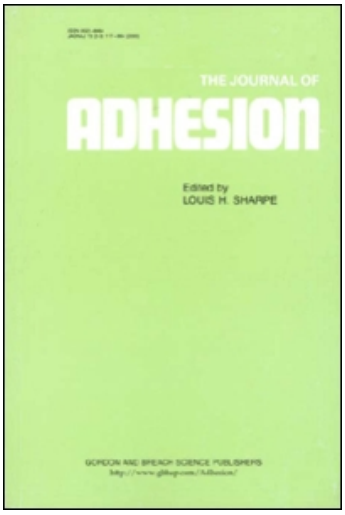

The Journal of Adhesion

Publication details, including instructions for authors and subscription information:
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Contents Lists and Abstracts from the Journal of the Adhesion Society of Japan

To cite this Article (1992) 'Contents Lists and Abstracts from the Journal of the Adhesion Society of Japan', The Journal of Adhesion, 38: 1, 153 — 156
To link to this Article: DOI: 10.1080/00218469208031272
URL: http://dx.doi.org/10.1080/00218469208031272

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J. Adhesion, 1992, Vol. 38, pp. 153–156
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Printed in the United Kingdom

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Journal of The Adhesion Society of Japan
Vol. 28 No. 1 1992

Contents

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Surface Properties of Cyclotetrasiloxane-containing Methacrylate Copolymers

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Abstract

Surface properties of 3-(heptamethylcyclotetrasiloxanyl) propyl methacrylate (HCPM)/methyl methacrylate (MMA) random and block copolymers were studied to draw a relationship between surface segregation of the cyclotetrasiloxane groups and adhesion performance. DSC analysis revealed that the PHCPM blocks in the block copolymer/PMMA blends were phase-separated from PMMA blocks miscible to PMMA homopolymer, in contrast to the random copolymers/PMMA blends. The water contact angles and ESCA analysis of the airside surfaces of the block copolymer blend films suggested preferential surface accumulation of the cyclotetrasiloxane groups. However, any significant decrease

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in 180° peel strength of their surfaces against pressure-sensitive adhesive tapes was not observed with the HCPM content. The discrepancy in the siloxane surface segregation and the adhesion performance was discussed mainly in terms of short chain length of the cyclotetrasiloxane side group.

(Received: July 25, 1991)

Journal of The Adhesion Society of Japan
Vol. 28 No. 2 1992

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New Derivatives of Imidazole as Curing Promotors for Dicyandiamide Cured Epoxy Resin

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Abstract

1-carbamoyl imidazoles were synthesized from imidazoles and isocyanate and were found to be useful accelerators of dicyandiamide cured one part epoxy resins. These acceleration effects were stronger than that of N, N-dimethyl urea or Monuron in tests of D. S. C., Gel time and HDTs, and they had good curing properties. These accelerators were also useful for biguanides, dihydrazides cured epoxy resins. Formulation of solid epoxy resin with dicyandiamide and 1-carbamoyl imidazoles had good storage stability and gave a good one part curing system.

(Received: August 5, 1991)

Strength of Adhesive Bonded Joint between Carbon Steel Shaft and CFRP Tube

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Abstract

The strength of shaft joints between carbon steel and carbon fiber reinforced plastic (CFRP) tube adhesively bonded with adhesive resin was investigated analytically and experimentally. The stress distributions under tensile load and torsional load were calculated using the finite element method. The strength of the adhesive shaft joint was predicted by applying the strength laws of CFRP, the carbon steel, the adhesive layer and their interfaces to the calculated stress distributions. The predicted strength was compared with the experimental strength of the joints. The effect of joint shape on the strength were discussed.

(Received: August 15, 1991)

Effect of the Varieties of Accelerators on the Thermal Properties of Epoxy Resins Cured with Novolak Type Phenol Resin

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Abstract

Effects of the kinds of accelerators and the ratio of epoxy/phenol groups on the curing mechanism and thermal properties of phenol-cured epoxy systems were investigated. 2-ethyl-4-methylimidazole (2 E 4 MZ) and Triphenylphosphine (TPP) were used as the accelerators.

Thus, it was shown that only the reaction of epoxy with phenol groups occurred in the TPP-accelerated system, even if the epoxy/phenol ratio was changed in the wide range. On the other hand, in the 2 E 4 MZ-accelerated system, the side reactions such as polymerization of epoxy group occurred in the region where excess epoxy was added.

Thermal properties of the cured resins was considerably affected by the varieties of accelerator. This behavior was explained in terms of the changing of crosslinking density through the difference of curing mechanism in each accelerated system.

(Received: September 30, 1991)

Journal of The Adhesion Society of Japan
Vol. 28 No. 3 1992

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Properties of Urethane Modified Epoxy Resin Adhesive

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Abstract

Polyether urethane modified epoxy resins were obtained from the reaction of the hydroxyl group attached to the backbone of bisphenol-A diglycidyl ether type epoxy resins with polyether urethane capped with diisocyanate.

These hybrid epoxy resins cured with dicyandiamide were investigated by lap shear strength. T-peel strength and thermal property to test their structural adhesion of metal.

This hybrid modification significantly increased the adhesive properties, especially the T-peel strength while keeping high shear strength, over the usual modification with liquid rubber.

The effects of modified polyether urethane content, solid epoxy resin content and the amounts of accelerator were also investigated.

Impact tests of this adhesive were also evaluated and the results showed that this hybrid modification toughened rigid epoxy resin.

(Received: August 5, 1991)

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Mechanical Behaviour of Spot Welded Joints and Adhesively Bonded Joints Under Tensile Loading

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Abstract

Deformation and strength of a spot welded joint under tensile loading were compared with those of an adhesively bonded joint. Strains of several points on both joints were measured using strain gauges. Also, the deformation of both joints was analyzed by means of the finite element method. In the case of the spot welded joints, a large bending deformation was observed around the spot welded region. The fracture of the one-spot welded joint initiated at the zone affected by heat of welding in the steel plates. Strength of the adhesively bonded joint was bigger than that of the spot welded joint. It was found that because a uniform distribution of the strain in the former joint decreased the stress concentration around this joint, the former joint had a superior characteristic.

(Received: October 4, 1991)