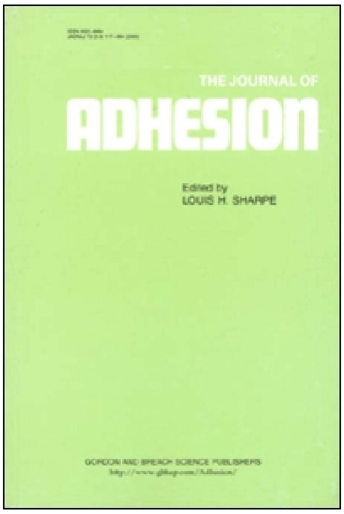

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Contents

Adhesion of Ion-plated Cobalt Thin Films on Poly(ethylene terephthalate) Films [III] – Effect of Introduced Gases –

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Abstract

Cobalt was deposited on Poly(ethylene terephthalate)(PET) Film by a RF-ion-plating technique in various conditions. The effect of gas species and pressure in the vacuum chamber on the adhesion at the cobalt thin layer-PET film interface was investigated by XPS spectrum and 90° peel strength.

The following results were obtained: (1) When Ar was introduced, the adhesion of ion-plated cobalt thin film to PET film was superior to that without any gas introduced. (2) When O_2 was introduced, ion-plated cobalt thin film was adhered less than that without any gas introduced. (3) When N_2 was introduced, the adhesion was superior to that with O_2 introduced and inferior to that without any gas introduced. (4) These influences of the atmospheres in RF-ion-plating on the adhesion between ion-plated cobalt thin film and PET film were explained with the elemental reactions in plasma, Penning effect and electron attachment etc.

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Investigation of Hydrogen Peroxide-Tartaric Acid Initiator System on Preparation of Poly(Vinyl Acetate) Latex in the Presence of Poly(Vinyl Alcohol) as Protective Colloid

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Abstract

The hydrogen peroxide-tartaric acid initiator system was investigated on the preparation of poly(vinyl acetate) latex in the presence of poly(vinyl alcohol) as a protective colloid. In order to proceed smoothly the polymerization by using this initiator system, it was found that alkali and iron ion are necessary to coexist in the polymerization system. Actually, sodium acetate in commercial poly(vinyl alcohol) serves as alkali, and iron ion contained in reactants or dissolved out from iron parts in a polymerization apparatus plays a part required for the polymerization. The polymerization is initiated by hydroxy radical arising from hydrogen peroxide-iron ion. Tartaric acid acts as a chelate agent or as a buffer agent of pH in the reaction media by a combination of sodium acetate rather than an activator of hydrogen peroxide. Since pH in the reaction media which influences a radical decomposition of

hydrogen peroxide is dependent on an amount of sodium acetate, the latex viscosity which is one of the most important properties is able to be controlled by changing its content.

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Ultimate Tensile Stress of Adhesive-bonded Scarf Butt or Single Lap Joint Under Bending Load

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Abstract

The ultimate tensile stress σ_u of the adhesive-bonded circular or reactangular scarf butt or single lap joint with a given length of overlap l, a given thickness of adhesive layer d, a given outside diameter of adherend D_0, a given thickness of adherend t, t_1, t_2 and a given width of adhered b, under bending load, can be calculated from the following formulas:

a), b) In the case of the adhesive-bonded circular scarf butt joint, $\sigma_u = M_B/(l^2 D_0 5\pi/64)$,

$$\sigma_{ud} = 0.4\sigma_B(D_0/l)^2$$
$$\sigma_{ui} = \sigma_{aB}/\alpha = (\sigma_{aB}/3.6)\sqrt{(E/G_a)(d/l)}$$
$$\sigma_{us} = 5.2\sigma_B(G_a/E)D_0^2/(ld)$$
$$\sigma_{ut} = \sigma_{aB}$$

c), d) In the case of the adhesive-bonded reactangular scarf butt joint, $\sigma_u = M_B/(l^2 b/3)$,

$$\sigma_{ud} = (\sigma_B/2)(t/l)^2$$
$$\sigma_{ui} = \sigma_{aB}/\alpha = (\sigma_{aB}/3.6)\sqrt{(E/G_a)(d/l)}$$
$$\sigma_{us} = 6.5\sigma_B(G_a/E)t^2/(ld)$$
$$\sigma_{ut} = \sigma_{aB}$$

e) In the case of the adhesive-bonded single lap joint between different materials, $\sigma_u = M_B/(l^2 b/3)$,

$$\sigma_{ud} = (\sigma_{B1}/2)(t_1/l)^2 = (\sigma_{B2}/2)(t_2/l)^2$$
$$\sigma_{ui} = \sigma_{aB}/\alpha = (\sigma_{aB}/3.6)\sqrt{(E_2/G_a)(d/l)}$$
$$\sigma_{us} = 6.5\sigma_{B1}(G_a/E_1)\{t_1^2/(ld)\}$$
$$\sigma_{ut} = \sigma_{aB}$$

Here E_1 and σ_{B1} represent the modulus of longitudinal elasticity and the tensile strength, respectively, of the adherend, and E_2 and σ_{B2} represent those of the another adherend ($E_1 > E_2$). G_a and σ_{aB} represent the modulus of transverse elasticity and the tensile strength, respectively, of the adhesive, and α represents the stress concentration factor.

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