

FILM NANO SiO₂-DODESILAMIN SEBAGAI MATERIAL PELAPIS KACA HIDROFOBİK

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INTISARI

Telah dilakukan penelitian tentang film hibrida nano SiO₂-Dodesilamin (DDA) sebagai material pelapis kaca hidrofofik. Penelitian ini bertujuan untuk menghasilkan kaca transparan yang bersifat hidrofofik serta memiliki ketahanan yang baik terhadap lingkungan lembab maupun udara ambien. Proses pelapisan film pada kaca dilakukan menggunakan metode sol-gel dengan teknik lapis-celup (*dip-coating*) dan laju penarikan 3 cm/menit. Pelapisan dilakukan secara bertahap (*layer by layer, LbL*) dengan urutan sol silika kemudian sol DDA. Kajian pengaruh rasio mol C/Si serta pengaruh jumlah lapisan film pada kaca dilakukan untuk mengetahui komposisi optimum dalam memperoleh kaca hidrofofik. Ketahanan film diuji pada lingkungan udara ambien (RH 50–70%, T = 27–32°) dan lingkungan lembab (RH>90%, T = 25°). Hidrofobisitas kaca ditentukan melalui pengukuran sudut kontak air. Transparansi film diuji dengan spektrofotometer UV-Vis, sedangkan kekasaran permukaan film dianalisis menggunakan *Atomic Force Microscope* (AFM). Hasil penelitian menunjukkan bahwa film hibrida nano SiO₂-Dodesilamin mampu meningkatkan hidrofobisitas kaca tanpa mempengaruhi transparansi kaca secara signifikan. Hidrofobisitas paling baik dengan sudut kontak air sebesar 98,8° ditunjukkan oleh film dengan rasio C/Si=7 dengan jumlah lapisan sebanyak 5 lapis. Citra AFM menunjukkan bahwa film tersebut mempunyai dimensi kekasaran permukaan yang lebih rendah daripada panjang gelombang sinar tampak yaitu 47,397 nm.

Kata kunci : sol-gel, film hibrida, kaca hidrofofik, transparan .

NANO SiO₂-DODECYLAMINE HYBRID FILM AS COATING MATERIAL FOR HYDROPHOBIC GLASS

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ABSTRACT

Research on the preparation of nano SiO₂-Dodecylamine (DDA) hybrid film as coating material for hydrophobic glass has been carried out. This research was aimed to produce transparent hydrophobic glass with sufficient durability toward ambient air and high humidity environment. The coating process has been carried out through sol-gel route by dip-coating method and withdrawal rate of 3 cm/min. The coating process was carried out through layer by layer deposition, began with deposition of silica sol then DDA. The effect of molar ratio of C/Si and total amount of film layers has been investigated to find out the optimum composition of the hydrophobic film. The durability of the film was tested in high humidity (RH>90%, T = 25°C) and ambient environment (RH 50–70%, T = 27–32°C). The hydrophobicity of the film was observed by water contact angle (WCA) measurement. Film transparency was tested by UV-Vis spectrophotometer, while the average roughness of the film surface was characterized by *Atomic Force Microscope* (AFM). The results showed that nano SiO₂-Dodecylamine hybrid film significantly increase the hydrophobicity of glass surface without significantly reduce the glass transparency. The best hydrophobic properties (WCA = 98.8°) resulted from the glass coated by 5 layers of hybrid film with molar ratio of C/Si of 7. The AFM image showed that the surface of this hybrid film has average roughness (47.4 nm) lower than the wavelength of visible light.

Keyword : sol-gel, hybrid film, hydrophobic glass, transparent.