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Effect of curing temperature on sol-gel formed glass coatings containing hBN nanoparticles

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Glass coatings, which were composed of SiO_2 - K_2O - Li_2O were obtained through sol gel technique, starting from TEOS, MTEOS, LiOH and KOH. Hexagonal boron nitride (hBN) nanoparticles (average diameter 70 nm) were added into glass coating solutions by mixing at 2000 rpm with zirconia beads. Coatings were formed on steel plates by spin-coating at 500-1000 rpm. Curing of the coatings was conducted at 500°C, 400°C and 300°C in air. Coatings were examined by scanning electron microscopy (SEM), Fourier transform infrared (FTIR) spectroscopy, X-ray diffraction (XRD) and thermo-gravimetric analysis (TGA). Adhesion tests were performed by using a multi-cross cutter. Thicknesses and Newton hardness values of the coatings were determined and friction coefficients were measured by an oscillating tribometer. Water contact angles were measured with a goniometer. Thicknesses of the coatings were in 0.6 μm -2.9 μm range. Friction coefficients were seen to increase with decreasing curing temperature. Water contact angle increased abruptly from 9° to 50°, when curing temperature was decreased from 500°C to 400°C. This was attributed to the presence of hydrophobic groups on the surface of the coatings, which was revealed by FTIR analyses, when curing was performed at 400°C or 300°C. Authors are grateful to The Scientific and Technological Research Council of Turkey (TUBITAK) for supporting this study with the Project Number 110M722.

Biography

Hasan Erdem Çamurlu has completed his PhD in 2006 from Middle East Technical University, Ankara, Turkey. Currently, he is an Associate Professor in the Mechanical Engineering Department of Akdeniz University, Antalya, Turkey. He has published more than 35 papers in reputed journals.

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