ANTICORROSIVE PROPERTIES OF HYBRID GLASSES OBTAINED VIA SOL-GEL CHEMISTRY

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Melting gels (MG) are hybrid polysilsesquioxanes with low glass transition temperatures (-18,8 ^{o}C). MGs are precursors of the methyl modified hybrid glasses which are obtained by annealing of the MGs at the consolidation temperature (150 ^{o}C). MGs are synthesized by the sol-gel method using methyltriethoxysilane (MTES) and dimethyl-diethoxysilane (DMDES) The main advantage of MGs is their processing ability. MGs can be processed as a thermoplastic melt into a desired form and then converted into a permanent structure. The MG were used to coat Stainless Steel (ASTM A 240), and Mg alloy (AZ31B) by: pouring of MG, dip-coating using diluted MG in EtOH (50 vol%), and by electrospray of MG solutions of 4 % in EtOH or 1 % in EtOH with addition of α-terpineol. These methods were employed to control the thickness of the coatings which varies from 490 μm for pouring to less than 10 μm for the electrospray coatings. By using dilute loadings of 1 wt% in electrospray these microdroplets delivered extremely small quantities of material at a continuous rate. Control of spray composition, voltage polarity, substrate temperature, flow rate, and collection distance, leads to adjustments in the

dynamic evolution of solvent evaporation and MG consolidation. The results reveal that these can be used to controllably tune surface structure from dense, to cellular, to superhydrophobic fractal coatings.

Samples were characterized structurally using FTIR and ^{29}Si NMR. Mechanical properties were investigated by nanoindentation hardness measurements and micro-scratch tests to evaluate the influence of coating method. The hydrophobicity of the surface was analyzed by measuring the contact angles. Electrochemical analysis (AP and EIS) has been performed in 0,35 wt.% NaCl solutions, showing a significant improvement of corrosion resistance.