Hydrogen Silsesquioxane based silica glass coatings for the corrosion protection of austenitic stainless steel - DTU Orbit (23/10/2019)

**Hydrogen Silsesquioxane based silica glass coatings for the corrosion protection of austenitic stainless steel**

The application of stainless steels in hostile environments, such as concentrated acid or hot sea water, requires additional surface treatments, considering that the native surface oxide does not guarantee sufficient corrosion protection under these conditions. In the present work, silica-like thin-film barrier coatings were deposited on AISI 316L grade austenitic stainless steel with 2B surface finish from Hydrogen Silsesquioxane (HSQ) spin-on-glass precursor and thermally cured to tailor the film properties. Results showed that curing at 500 °C resulted in a film-structure with a polymerized siloxane backbone and a reduced amount of Si-H moieties. The coatings showed good substrate coverage and the average thickness was between 200 and 400 nm on the rough substrate surface, however, film thicknesses of > 1400 nm were observed at substrate defects. Deposition of these films significantly improved the barrier-properties by showing a 1000 times higher modulus while an ionic transport over the coating was also observed.

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