

**STUDY ON THE TITANIUM-RESORCINOL
COPOLYMER AS CERAMER COATING**

Ph.D DISSERTATION

YU YU MYO

**DEPARTMENT OF CHEMISTRY
UNIVERSITY OF YANGON
MYANMAR**

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ABSTRACT

Ceramer materials consisting of titanium-resorcinol copolymer has been prepared by using titanium isopropoxide and resorcinol in certain proportions of mole ratio with and without using an additive, triethylamine. A 1:3 mole ratio of titanium isopropoxide and resorcinol was the optimal ratio to form an orange coloured copolymer. The yield % of the ceramer precursors were 62.56% (prepared with an additive) and about 63% (prepared without an additive) respectively. On physicochemical characterizations such as solubility, thermal stability by TG - DTA and DSC, FTIR analysis, XRD, SEM and microscopic examination, the ceramer precursors were more likely to be a copolymer with a layered like structure. Moreover, the prepared copolymer possessed the same formula unit and similar properties whether it was prepared by using an additive or without an additive. But SEM and microscopic examination were able to show that the copolymer without an additive exist independently where as those prepared with an additive exist as smaller size particles and as an agglomerated cluster form.

Ceramer coatings based on the sol-gel precursor, titanium-resorcinol copolymers were also studied by using MnO_2 and H_2O_2 , oxygenated blown vegetable oils : sunflower; soyabean (semi-drying) and kanzwe (non-drying) oils as vehicles. Studies consist of using different wt% of the copolymer and determining the physico mechanical properties : solvency in different solvents, hardness of the coated films, scratch resistance and elasticity nature of the

films, temperature and weather resistance of the films. It was found that the aesthetic quality of the ceramer coating depends on the wt% of ceramer used, nature of the composition of vegetable oils; ie Drying Index, time frame of heating as well as the heating temperature. Aesthetic quality of the coated film was displayed when 15 wt% of ceramar formulation was used and when the vegetable oils were blown up for 1½ hours. Ceramer coatings based on sunflower and soyabean except kanzwe were observed to produce smooth, reflective, high scratch resistance, hard surface texture within the time frame of 1 hour at 210°C heating temperature. For kanzwe oil longer period of heating time ie., in 13 hours and at 210°C has to be taken to produce a quality coating surface.

The ceramer coatings by the sol-gel process using inorganic-organic hybrid with blown vegetable oils has great potentiality in the ceramic and glass industries.

Key words: ceramer, titanium-resorcinol copolymer, blown vegetable oil, Drying Index DI, quality coating glass surface.