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Single-Layer and Multilayer Partially Stabilized Zirconia-Ytria Nanostructured Films Characterization by SEM, AFM, TEM and EDS.

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Single-layer and multilayer coatings of Partially Stabilized Zirconia-Ytria nanostructured films were deposited on stainless Steel 316L by (EPD) [1]. Electrophoretic deposition is the process whereby gel particles are deposited from a suspension on to an electrode of opposite charge, on application of a d. c. electric field.

The stainless steel plates covered with 3Y-TZP were analyzed by SEM, AFM, TEM and EDS. It was observed by AFM that the films consisted of globular-plate like nanoparticles that formed nanoaccordion type morphology. The monolayer film was unirform and smooth, the maximum obtained highest on 3-D AFM-image was 24.5 nm, and 196 nm for the three layer sample, in figure 1 shows a 3D AFM topographic image of the 3Y-TZP three layer film.

The film particles were observed by TEM, bright and dark field images were obtained. The film is formed by nanoparticle agglomerates, they are composed by nanocrystallites[2] of 5-20 nm mean diameter. HRTEM images let us to determinate that the film was composed by tetragonal and some monoclinic grains that were twinned because the tetragonal-monoclinic 3Y-TZP transformation[3] during the thermal treatment at 800°C. EDS spectrum of monolayer 3Y-TZP film, resulted with 400 counts for zirconium and small peak of yttrium (Fig 3). The low angle XRD analysis indicated that the obtained zirconia-ytria film crystalline phase is tetragonal.

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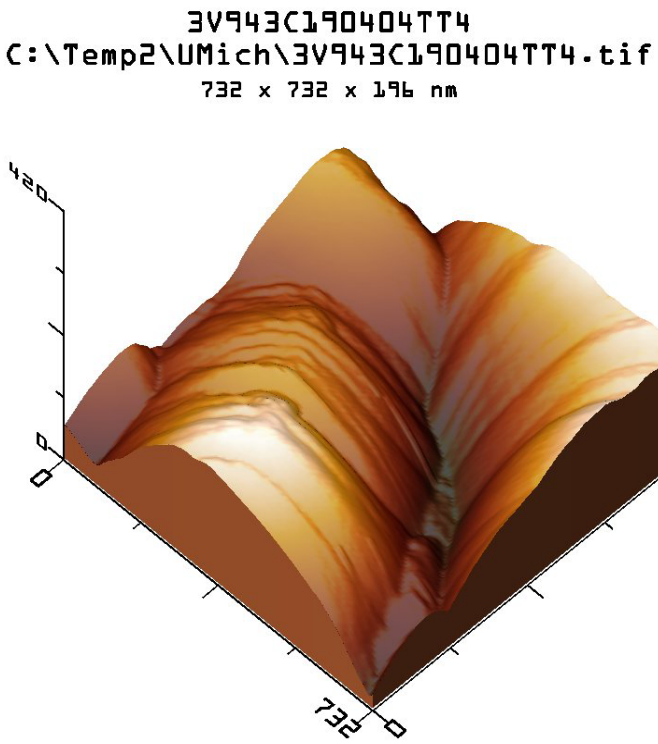

Figure 1 A 3D AFM topographic image of the 3Y-TZP film.

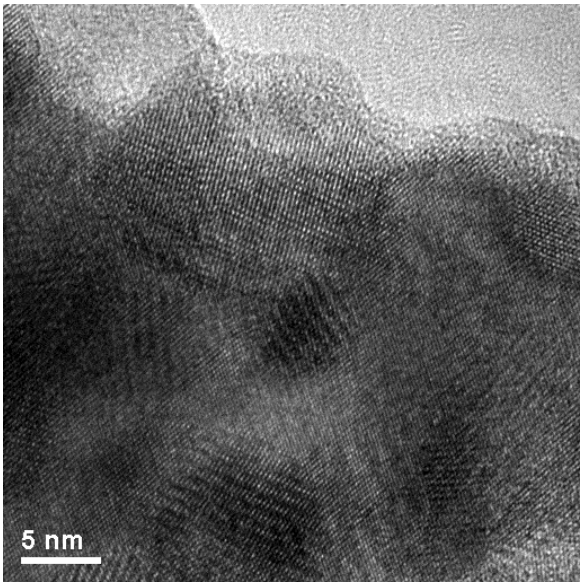

Figure 2 TEM micrograph of particles of 3Y-TZP

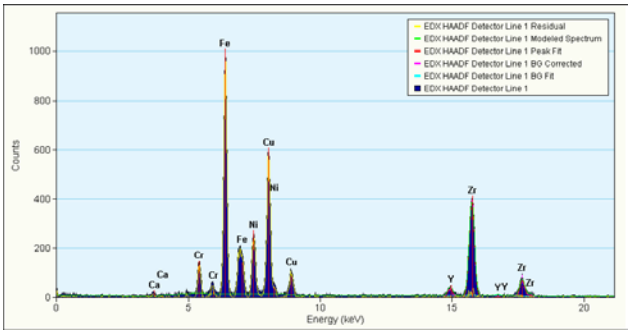

Figure 3 EDS spectrum of particles of 3Y-TZP

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