

Bioapplications of electrosprayed coatings based on chitosan, bioglass and zinc oxide on Ti-Zr-Ta-Ag

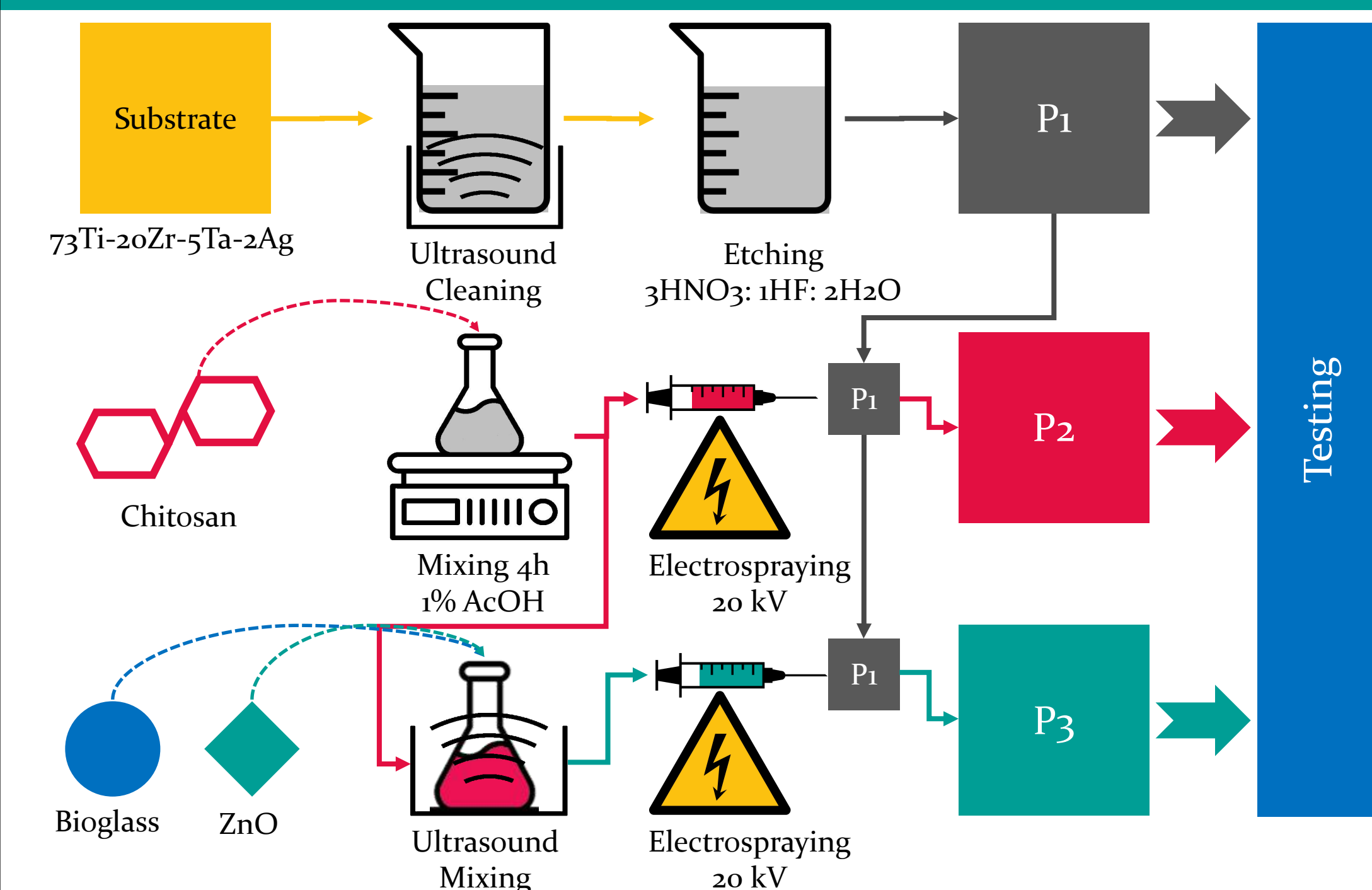
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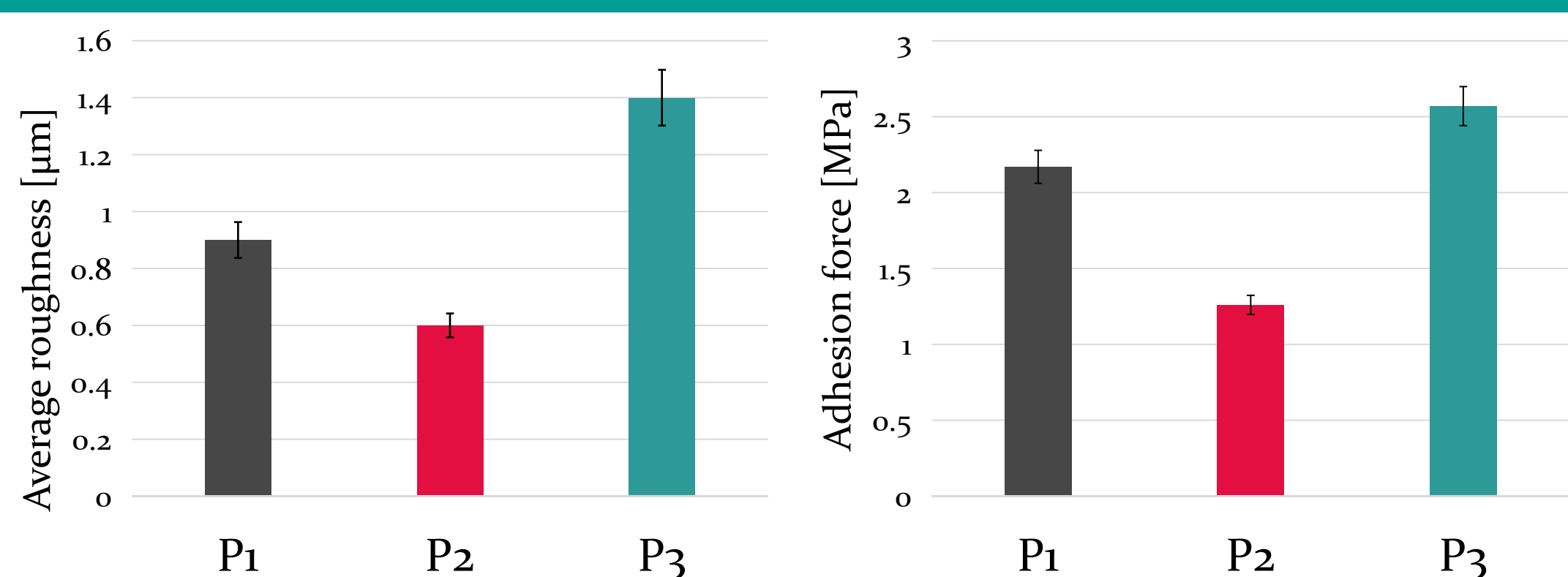
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Sample Preparation



Coating Properties

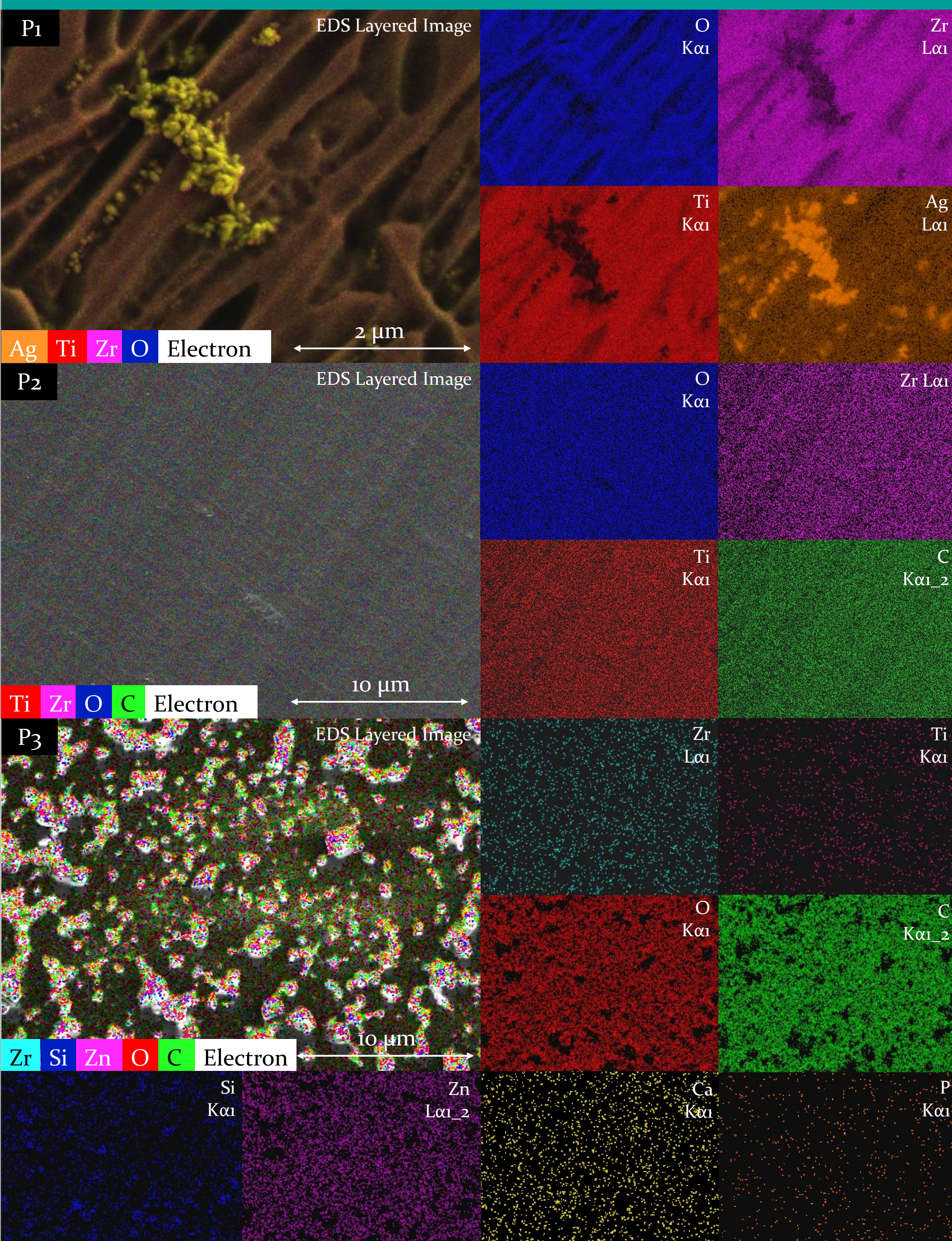


The addition of BG and ZnO to the chitosan coating led to an increase of adhesion force and roughness of the composite film.

The mixture possibly reinforces the polymeric film by the formation of chemical bonds between the chitosan and metallic oxide particles.

Oxide particles protruding from the film as a result of film shrinkage during drying resulted in an increase of roughness.

Surface Composition

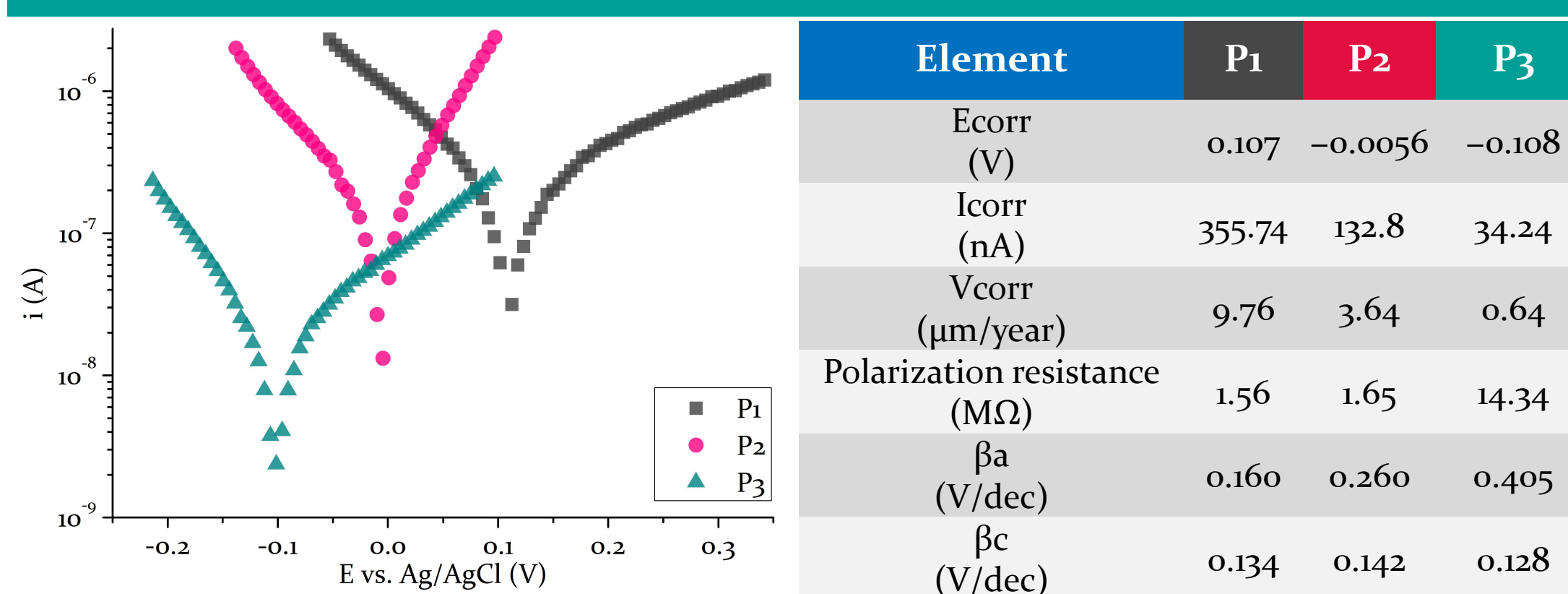


Sample P1 had the surface uniformly covered with Ti and Zr oxides. Clusters of Ag were identified on the surface.

On sample P2 the thickness of the chitosan film prevents the direct visualization of the substrate; the Ti and Zr oxides are present beneath.

On sample P3 the ceramic particles were embedded in the chitosan film. The particles had a uniform dispersion on the surface.

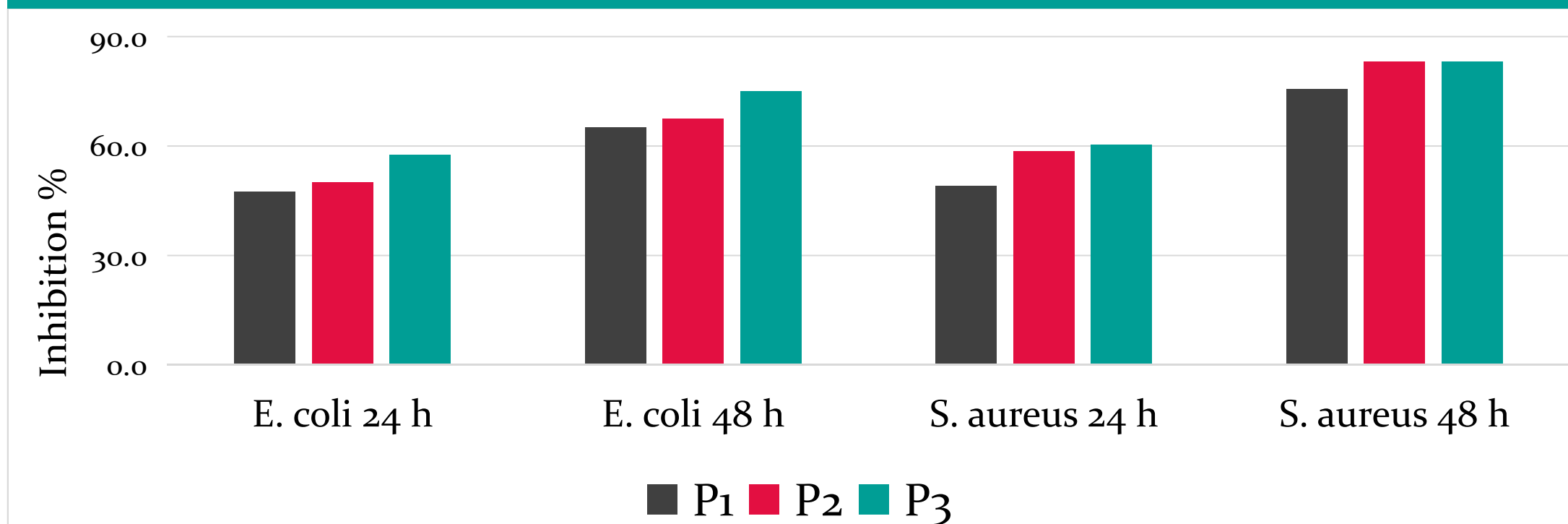
Corrosion Resistance



A small decrease in the corrosion current and the corrosion rate was observed when comparing samples P1 and P2 that can be attributed to the filling of surface imperfections with chitosan.

Sample P3 had the best corrosion resistance, hinting that the bioglass and ZnO nanoparticles dispersed in the polymeric matrix play a major role in corrosion protection.

Antibacterial Activity



The ZnO and bioglass particles present in the coating of sample P3 successfully inhibited bacterial growth by 83% in the case of *S. aureus* and 75% in case of *E. coli* after 48 h.

The ZnO particles have abrasive textures that can destroy the bacterial membranes.

Acknowledgement

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