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Study of Resin Lining Method in Salt Manufacturing Plants Utilizing Atmospheric Pressure Plasma Processing

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Summary

Corrosion-proofing all metallic materials including piping and support rods is crucial to achieving efficient operation at salt manufacturing plants. Accordingly, this study investigated and examined the effects of air-blasting and atmospheric pressure plasma treatment in pre-treating resin lining with the aim of developing resin lining technology with superior corrosion resistance in salt manufacturing plants.

This study conducted investigations on particle projectile conditions in air-blasting treatment, surface reformation conditions of metallic materials, and tests on corrosion resistance performance under the conditions of the treatments. Glass, silicon carbide, and alumina were used as the projectile materials for the air-blasting treatment. The results indicated that elements of the projectile material adhered to the surface of the metallic materials regardless of the projectile.

The surface reformation conditions of the metal were evaluated using static contact angles. As a result, static contact angles were at a minimum when treating with atmospheric pressure plasma following air-blasting treatment using alumina as the projectile.

Anti-corrosion performance tests were conducted under the conditions of each treatment. In this study, adhesion tests of each test material bonded with CR rubber were conducted both before and after degradation tests. The results indicated destruction in the CR rubber itself regardless of whether or not atmospheric pressure plasma treatments had been administered when air-blasting treatment was conducted using alumina as the projectile. In order to quantitatively evaluate the adhesive power produced by the combination of air-blasting and atmospheric pressure plasma examined in this study, the degradation testing methodology needs to be reassessed. Regardless, the significant improvement in the impermeability of the metallic surfaces through the combination of air-blasting and atmospheric pressure plasma treatment suggests the possibility of extremely high adhesive power manifestation.