

## Revealing the role of passive and non-passive elements in the passive film of amorphous Al alloys

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**Abstract:** In most environment, the corrosion of commercial Al alloys is associated with the galvanic corrosion between anodic and cathodic regions due to the existence of second phases. In recent work, amorphous Al alloys were produced by magnetron sputtering to improve the strength and corrosion resistance simultaneously. Specifically, the passivation mechanism of amorphous Al-Mn and Al-Mn-Mo alloy thin films in NaCl solution were studied detailly.

The origin of passivity in amorphous Al-Mn alloys were investigated by combining experiments and molecular dynamic simulations [1]. The surface analysis confirmed that Mn did not participate in the surface oxidation. It is believed that Mn dissolution can increase the free volume at the metal/oxide interface, leading to the formation of a dense, thin oxide layer on the surface of Al-Mn alloys. Moreover, the effect of alloying concentration on the corrosion behaviors of Al-Mn-Mo alloys were investigated [2]. It is expected that the pitting potential of alloys increased with Mo. It is interesting to note here that Mo addition to the alloys can reduce the defect density of the passive film, a higher oxidation state of Mo ions (+4 and +6) can create more free electrons to combined with oxygen vacancies.

### Keywords

amorphous Al alloys, passivation mechanism, Mn dissolution, defect density

### Reference

- [1] J. Chen et al., *Corrosion Science*, 2020. 173: p. 108749.
- [2] J. Chen et al., *Corrosion Science*, 2022. 198: p. 110137.