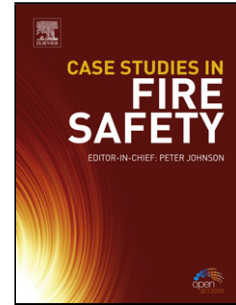


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# Effect of iron content on the corrosion of pure magnesium: critical factor for iron tolerance limit

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## Highlights

- Presence of Fe-rich particles doesn't necessarily lead to severe corrosion in Mg
- Presence of Fe-rich particles leads to the increase of corrosion potential.
- Breakdown of surface film occurs at a critical value of corrosion potential.
- After breakdown of surface film, corrosion rate increases significantly.
- Corrosion potential is the critical factor for corrosion tolerance limit of Fe.

## Abstract

The present work investigates the corrosion behaviour of magnesium with different Fe contents. It is found that the micro-galvanic coupling between Fe-rich particles and magnesium matrix results in surface film formation and decrease in anodic reaction rate, consequently, increase of corrosion potential. Depending on the population density of Fe-rich particle, if the corrosion potential increases to the breakdown potential of surface film, localized corrosion initiates at the sites of breakdown. It is observed that Mg with different Fe contents exhibit the same critical potential value for corrosion initiation. Thus, corrosion potential is a critical factor for the corrosion tolerance limit of Fe in Mg.

**Keywords:** magnesium; iron; tolerance limit; corrosion potential; surface film breakdown

## 1 Introduction

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