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Magnesium Anodization Reaction Kinetics

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The reaction mechanisms of aluminum anodization in sulfuric acid electrolytes are well understood, but magnesium anodizing is not so well characterized. While a number of processes exist, the film that is formed is not a simple oxide. Many processes form some other species or mixture of species, and there is accordingly a broad range of properties obtainable from the various processes that are available to the market. This paper studies the oxidation kinetics of one commercially available process, considering how film formation by way of oxidation may be balanced by competing reactions, given that magnesium has a radically different chemistry than aluminum and the resulting coating is structurally quite different. Because the use of magnesium alloys in die casting is rapidly increasing worldwide, a better understnding of magenesium chemistry is central to demands for corrosion resistance and durability of manufactured components.

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