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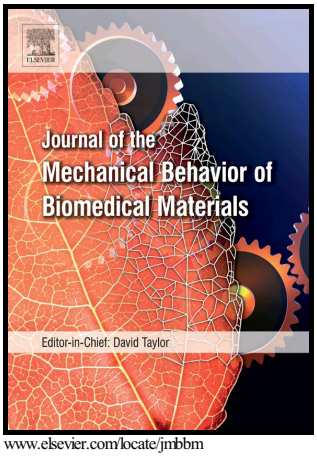

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Effect of dissolution of Magnesium alloy AZ31 on the rheological properties of Phosphate Buffer Saline

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Abstract

The issue of long-term incompatible interactions associated with the permanent implants can be eliminated by using various biodegradable metal implants. The recent research is focusing on the use of degradable stents to restore most of the hindrances of capillaries, and coronary arteries by supplying instant blood flow with constant mechanical and structural support. However, internal endothelialization and infection due to the corrosion of implanted stents are not easy to diagnose in the long run. In the recent past, magnesium (Mg) has been widely investigated for the cardiovascular stent applications. Here we made an attempt to understand the biodegradation process of Mg alloy stent by studying the degradation of Mg alloy AZ31 (3 wt. % Aluminum, 1 wt. % Zn) powder at various time-intervals in simulated blood fluid using the Rheological methods. The degradability of the Mg stent in the arteries affects the stress-strain properties of blood plasma and the subsequent flow conditions. Blood and plasma viscosities alter due to the degradation of Mg resulting from the stress-strain experienced in the blood vessels, in which the stent is inserted. Here our objective was to explore the influence of Mg degradation on the blood plasma viscosity by studying the viscoelastic properties. In this work, the effect of dissolution of Mg alloy AZ31 on the rheological properties of Phosphate Buffer Saline (PBS) at various time intervals have been investigated. The viscosity of the PBS-AZ31 solution increased with the dissolution of both slurries and percolated clear solution. The only exception was day-7 of the percolated clear solution, where viscosity was decreased showing a reduction in viscosity at initial stages of dissolution. The frequency sweep showed the tendency of the PBS-AZ31 gelation up to 100 rad/s frequency.

Keywords: biodegradation, implants, stent, magnesium, Phosphate Buffer Saline, rheology, viscosity