마그네슘 합금 부식 산화물에 대한 특성 연구

Integrated characterization of the corrosion products of Mg alloy

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초 록: pure Mg and some Mg alloys are relatively rapidly corroded after operation, resulting in the decrease of mechanical strength and change of local ion concentration. In this study, the corrosion mechanism of biodegradable implant materials was investigated by corrosion tests of the Mg alloy in Hank's solution. Particularly, the crystal structures and chemical bonding state of corrosion reactants was systematically examined

1. 서론

Since implant materials using for bone disease should support load, it is necessary to have characteristics such as relatively high mechanical strength and biocompatibility.
Biodegradable implant materials require relevant mechanical strength at the beginning of implant, biocompatibility of the corrosion reaction, and controllable corrosion rate etc. Recently, Mg alloy systems have been proposed as promising candidates being able to meet such requirements.

2. 본론

In this study, Mg alloy with primary Mg and lamellar structure was in-vitro tested in Hanks' solution. We have performed comprehensive analysis on corrosion product and then discussed on biodegradable corrosion mechanism in Mg alloy.
The cast alloy rapidly corroded and large amount of corrosion product and cracks were formed at the surface of alloy. Interestingly, while primary Mg and lamellar Mg did not nearly corrode, lamella Mg_2Ca phase quite rapidly corroded and also showed the characteristics of bulk diffusion.

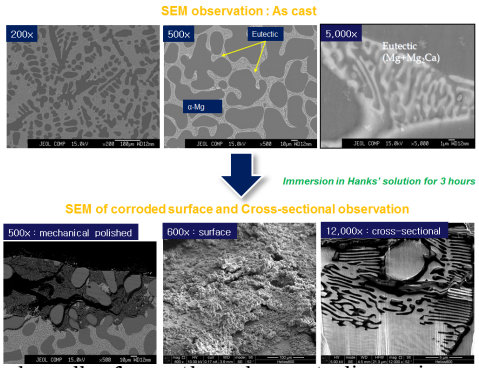

figure 1. The corrosion of the lamella from the element dispersion of Mg, O, and Ca showed a very unusual behavior that L-Mg did not corrode, but only L-Mg_2Ca did

3. 결론

The corrosion of Mg-Ca alloy was progressed via chemical exchange, which Ca dissolved from Mg_2Ca was diffused out, while oxygen was diffused in the Mg alloy. The Mg remained after the dissolution of Mg_2Ca was combined with oxygen and thus transformed into oxides. In this study, we found that the binary Mg-Ca alloys showed different corrosion behavior at the surface and internal area, forming amorphous MgO and $Mg(OH)_2$ at surface, but amorphous MgO at internal area.

참고문헌

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