

Electrodeposition of Aluminium from Gel Electrolyte
using Tetrahydrofuran.

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The electrochemical deposition of aluminium from aqueous solutions is practically impossible because of the much less noble deposition potential of aluminum (-1.66 V versus SHE). The three types of non-aqueous solutions have been used for Al electrodeposition: (a) ether solvent baths containing $\text{AlCl}_3 + \text{LiAlH}_4$ (called hydride bath)¹⁾, (b) $\text{Al}(\text{C}_2\text{H}_5)_3 + \text{NaF}$ in toluene²⁾, and (c) the room temperature molten salt³⁾. The hydride bath is most suitable for aluminum electrodeposition among the above-mentioned baths. The deposited aluminum film from hydride bath was especially pure, non-porous, silver-white in color, and good adhesion nature to the substrate surface. However, these plating baths have difficulty in practical use due to the volatile and the burning quality.

Recently a gel polymer electrolyte is frequently used in various electrochemical applications, i.e., lithium-ion batteries. Itagaki *et al.*⁴⁾⁻⁶⁾ investigated the electrodeposition of copper by using gel electrolyte. By the electrodeposition with gel electrolyte, the precise pattern plating can be performed and the electrolysis can be operated with small amount of electrolyte.

Firstly in the present paper, the pattern Al-plating using small amount of gel electrolyte is established. And the optimal condition of gelation was examined. In the synthesis of gel electrolyte, tetrahydrofuran (THF) was used as a solvent and polyvinyl chloride (PVC) was used as a gelating agent. Secondly, the electrochemical behavior in the gel electrolyte containing aluminum ion was investigated by cathodic polarization curves and chronoamperometry. The optimal condition for aluminum deposition in gel electrolyte was examined.

References

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