

New Polymer Gel Membrane Electrolytes For Aluminum Deposition

Disclosure Number

201303206

Technology Summary

Electrodeposition of aluminum is an attractive technique because it leads to thin, economical coatings that usually are adherent and do not affect the structural and mechanical properties of the substrate. So far, on a commercial basis, aluminum is plated by using the SIGAL process patented by Siemens in 1977 using pyrophoric and toxic alkyl aluminums, which has raised a number of environmental and safety issues. An alternative process has been developed using chloroaluminate anions obtained by mixing anhydrous AlCl_3 with organic chloride salt such as 1-ethyl-3-methyl imidazolium chloride (EMImCl). Unfortunately, because of the hygroscopic nature of AlCl_3 and the chloroaluminate, the electroplating has to be performed in an inert-gas atmosphere. We have developed a way of reducing the moisture sensitivity of the chloroaluminate based ionic liquids in practical applications by impregnating the liquid electrolytes into a polymer matrix to form the polymer gel membrane. In practical applications, the polymer gel membranes can be casted directly onto aluminum foil, which can be wrapped around the plating substrate to conduct the plating. In this configuration, the aluminum foil serves as the anode and the substrate as the cathode during the electroplating process. This process can facilitate the electroplating process at places where the substrate is either too big to fit into conventional plating bath or the configuration of the substrate prohibits such a plating process.

Inventor

SUN, XIAO-GUANG

Chemical Sciences Division

Licensing Contact

CALDWELL, JENNIFER T

UT-Battelle, LLC

Oak Ridge National Laboratory

Rm 137, Bldg 4500N, 6196

1 Bethel Valley Road

Oak Ridge, TN 37831

Office Phone: (865) 574-4180

E-mail: CALDWELLJT@ORNL.GOV

Note: The technology described above is an early stage opportunity. Licensing rights to this intellectual property may be limited or unavailable. Patent applications directed towards this invention may not have been filed with any patent office.