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Characterization of sputter-deposited w-44cr-35al alloys and their corrosion behavior in aggressive media

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The synergistic effect of the simultaneous additions of chromium and aluminum in the sputter-deposited amorphous or/and nanocrystalline W-44Cr-35Al alloys is studied in 1M HCl, 0.5M NaCl and 1M NaOH solutions open to air at 25 ±1°C using immersion tests, electrochemical measurements and surface morphological analyses.

Aluminum and its alloy have been extensively used in industry because of their useful properties such as low density, good appearance and corrosion resistance. However they are susceptible to pitting corrosion when exposed to various acidic, alkaline and neutral media. The sputtered-deposited alloys, either amorphous or Nano crystalline single phase solid solutions are chemically more homogeneous and conventionally processed alloys and hence are interesting to develop the corrosion resistance materials during last few decades. It has been reported that the chemically homogeneous single phase nature of amorphous and Nano crystalline alloys are responsible for high corrosion resistance owing to the formation of uniform protective passive films that are able to separate the bulk alloy from aggressive solutions.

The aluminum alloy was prepared by sputtered deposition technique. In three component aluminum alloy consisting Al, Cr, and W the higher corrosion resistance depends on the percentage composition of Tungsten. During X-Ray Diffraction, the atoms are nanocrystalline. The Scanning Electron Microscopy/EDS shows the atoms are distributed homogeneously.

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