

Corrosion properties of 316L stainless steel coated with polyelectrolyte multilayers of varying anionic acidity.

Khaled, M.; Abu-Sharkh, B.; Amr, E.; Yilbas, B. S.; Manda, A.; Abulkibash, A.

Corrosion Engineering, Science and Technology (2007), 42(4), 356-362.

Abstract

Polyelectrolytes have been proposed as promising systems for the protection of stainless steels and for biomedical and drug release applications. Multilayer nanofilms with varying anion acidity were deposited on AISI316L stainless steel. The cationic polyelectrolyte was polyallylamine hydrochloride (PAH) whereas the anionic polyelectrolytes with increasing acidity were polyacrylic acid (PAA), polystyrene sulfonate-co-maleic acid and polystyrene sulfonate (PSS). Potentiodynamic polarisation showed an increase in corrosion potential E_{corr} upon coating with multilayer nanofilms and a corresponding decrease in corrosion current. Transient currents were observed upon application of PSS due to its high acidic strength although it showed better pit recovery characteristics as shown in cyclic polarisation expts. Const. potential expts. at 700 mV v. Ag/AgCl for 12 h showed a suppressed current by 50% for the PAH/PSS coated steel compared to the uncoated specimen. The SEM images showed the existence of agglomerates, uncovered areas and corrosion products underneath channels on the coating.