

Titanium Dioxide as Protective Thin Films for Aluminum Beverage Containers

V.M. Dias¹, C.A. Razzino¹, N.M. Martinelli¹, V.A. Christino¹, M.C. Barbosa¹, A.O. Lobo¹,
R.S. Pessoa², F.R. Marciano^{1*}

¹Laboratório de Nanotecnologia Biomédica, Univap, Av. Shishima Hifumi 2911,
São José dos Campos, 12.244-000, SP, Brasil.

²Laboratório de Nanotecnologia e Processos a Plasma, Univap, Av. Shishima Hifumi 2911,
São José dos Campos, 12.244-000, SP, Brasil.

* frmarciano@univap.br

Several types of coatings are used for corrosion protection of food packaging [1]. In aluminum beer cans, coating failures might result in the interaction of the aluminum surface with beer. It results in corrosion and migration of metals to the product [2]. Atomic Layer Deposition (ALD) enables thin films to be obtained on different surfaces with compliance and control of thickness up to atomic level. The deposition of titanium dioxide (TiO₂) stands out due to its high chemical stability [3]. This work evaluates the coating of TiO₂ in commercial aluminum cans of beer regarding their electrochemical behavior. The samples (1 cm²) were separated in three groups: (i) aluminum cans, (ii) commercial coated aluminum cans and (iii) TiO₂ coated aluminum cans. The TiO₂ were obtained from the ALD process (100 °C / 1000 cycles), BeneqTFS200 equipment. The evaluation of the corrosion resistance was carried out in a potentiostat / galvanostat AUTOLAB302N (Metrohm). Commercial beer was the electrolyte. The electrochemical impedance spectroscopy (EIS) tests were performed on open circuit potential (OCP) for 1h. The protection efficiency was calculated for each sample. The results demonstrate an increase of up to twice the order of magnitude in the protection of aluminum when coated with TiO₂.

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