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Evaluation of Intervened-Food Adhesion to Multilayer Metal–Polymer Containers

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Metal–polymer materials are knowledge-intensive both at the structural and functional level and are currently widely employed in food packaging applications. These composites consist of an electrolytic chromium layer (Cr^0 and Cr_2O_3), with an average thickness of 200 nm, deposited on a steel (ECCS) sheet and protected by a polyethylene terephthalate (PET) polymer coating (30-50 µm) to prevent physicochemical interactions between the food and metal substrate. However, deep drawing manufacturing defects compromise the functionality of the composite due to the generation of Lüder's bands on the steel, nanocracking of the chromium layer, and delamination of the PET coating [1]. It has been determined that salmon adheres to polymer-coated can walls. This work intends to evaluate the effect of salmon adhesion on the wall, such as the chemical and structural changes undergone by the material. The production process of farmed salmon involves the incorporation of vaccines and chemicals to improve their immune system against diseases, and of artificial elements in their diets to increase production. Even though this chemical-dietary intervention has no harmful effect on human health, our hypothesis is that it does have an impact on the functionality of the composite. Hence, we evaluated the effect on the chemical bonds of the composite by a set of urea- and alcohol-based reactions. The adherence and migration of elements to the metal–polymer layers were analyzed by DRX, Raman spectroscopy, FT-IR, and electron microscopy [2]. The results showed that salmon adheres to areas of failures, generating complex compounds and altering the orientation and structure of the protective polymer in contact with food (Fondecyt Projects Nos. 1100386 and 1130634, Conicyt, Chile).

References

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