

Ampacet FauxFoil™: alternative solution to aluminum foil & metallized films designed for flexible structures

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ABSTRACT

Ampacet **FauxFoil™** is an innovative Masterbatch technology that mimics the aesthetics of aluminum foil and metallized films. It represents a proactive solution to environmental issues related to aluminum production, reducing significantly the carbon footprint and the risk of forming acid rains.

Ampacet **FauxFoil™** technology provides with: a) Foil-like aesthetics with possible customer color options, b) Good light blockage for content protection, c) Simplicity through coextrusion eliminating the need to laminate with aluminum foil or metallized film, d) High and easy recyclability making it a good solution towards Circular Economy and e) Compatibility with barrier polymers offering no loss of barrier properties as free of pin holes

1. Introduction

Aluminum is the most widely used metal in the packaging world, for drink & food cans, aerosol cans, and also in flexible packaging where aluminum foil or vacuum deposited aluminum bring enhanced aesthetics as well as barrier properties to the packaging.

The manufacture of aluminum brings environmental impacts associated with each stage of its production, from extraction to processing. The entire process is highly energy consuming, requires large amounts of electricity & water and leads to strong greenhouse gas emissions as well as acid rains.

Companies using aluminum foil in their products and process become more and more conscious about these related environmental concerns and look for aluminum substitutes. This trend is further

amplified by the new circular economy policies as recycling of flexible packaging containing aluminum foil or vacuum deposited aluminum film in their structure appears challenging.

Ampacet has developed an alternative technology to aluminum, FauxFoil™, which shows the aesthetic benefits of aluminum but makes the packaging sustainable as it is recyclable.

FauxFoil™ technology can be combined with the use of barrier polymers offering a pin-hole free barrier packaging film with no loss of barrier properties.

Herein, the technical benefits of FauxFoil™ as well as the expected performances from an industrial implementation for the production of flexible packages is described.

2. Experimental

Ampacet FauxFoil™ is a masterbatch technology resulting from the combination of a highly reflective silver masterbatch together with a premium quality white masterbatch, distributed in the various layers of a multi-layer polyolefin film.

As a result, such multi-layer film is providing high gloss and shine allowing to mimic the aesthetics of aluminum foil or metallized films avoiding the need to laminate or metallize the film when only aesthetic matters (Figure 1).

The films containing FauxFoil™ can be then transformed into flexible packages such as pouches, as well as processed to obtain labels.



Figure 1 – Representation of FauxFoil™

3. Optical and barrier properties

Ampacet FauxFoil™ is integrated into multilayer film structures using conventional co-extrusion technologies.

To illustrate the optical properties, 50 µm blown films with a 3-layers structure were fabricated. Films with different thickness ratios and compositions of the layers were compared (Table 1).

Whatever the film structure and composition tested, the use of FauxFoil™ technology allows to achieve excellent shine (gloss values measured above 70 at 45° angle) and very good opacity (light transmission measured below 15% with good optical density).

While Ampacet FauxFoil™ technology should not be used alone for high barrier properties to oxygen and water-vapor, when used in thick film structures, FauxFoil™ can provide some improvement in barrier properties.

In the 75 µm 3-layers film structure tested, the use of FauxFoil™ technology allowed to reduce the oxygen transmission rate by 25% and the water-vapor transmission rate by 20% compared to a control transparent film with similar structure (Table 2).

When packaging requires high barrier properties, FauxFoil™ technology bringing the aesthetics can be used in combination with polar barrier polymers such as EVOH or Polyamide for the barrier performances. Such barrier film structures:

- Keeps the aesthetic of aluminum foil or metallized film.
- Eliminates the risk of pin holes occurring in metallized films, avoiding loss of barrier properties
- Allows easier recyclability thanks to the simplified flexible packaging structures

4. Sustainability advantages

Ampacet FauxFoil™ technology is supportive of the increasing sustainability requirements as it allows simplification of the film structures avoiding the use of aluminum and its difficulty for recycling.

Table 1 – Optical properties using FauxFoil™ technology

| 50 µm Blown Film | Outer Layer | Core Layer | Inner Layer | Gloss @ 45° | Light Transmission [%] | Optical Density |
|------------------|-------------|-------------------------|-------------|-------------|------------------------|-----------------|
| Control Film | 20% | 60% | 20% | / | / | / |
| | LLDPE | LDPE | LDPE | | | |
| Film #1 | 20% | 60% | 20% | 70 | 7.3 | 1.22 |
| | LLDPE | 10% FauxFoil 054 | 10% 111413 | | | |
| Film #2 | 20% | 40% | 40% | 70 | 13.5 | 0.94 |
| | LLDPE | 20% FauxFoil 054 | 10% 111413 | | | |
| Film #3 | 20% | 40% | 40% | 70 | 10.1 | 1.20 |
| | LLDPE | 20% FauxFoil 054 | 20% 111413 | | | |

Table 2 – Barrier properties using FauxFoil™ technology

| 75 µm Blown Film | Outer Layer | Core Layer | Inner Layer | OTR @ 23°C / 0% RH [cm³ / (m² x day)] | WVTR @ 37.8°C / 90% RH [g / (m² x day)] |
|--|-------------|-------------------------|-------------|---|---|
| Control Film | 20% | 60% | 20% | 2,100 | 0.26 |
| | LDPE | HDPE | LLDPE | | |
| Film #1 | 20% | 60% | 20% | 1,500 | 0.20 |
| | LDPE | 20% FauxFoil 054 | 10% 111413 | | |
| Barrier Properties Improvements | | | | ≥ 25 % | ≥ 20 % |

5. Fabrication of end Products

Ampacet FauxFoil™ technology could be used in the manufacture of several end products:

- Silver-like applications as automotive liquids packaging, merchandise packaging, labels... where only aesthetics matter
- Barrier packaging applications like coffee pouches, pet food packaging, snack food packaging, single-serve juice and beverage pouches... where used in combination with barrier polymers.



Figure 2 – Some examples of end products representing FauxFoil™ possible applications

6. Conclusions

Giving a lot of importance to environmental issues and circular economy, Ampacet **FauxFoil™** technology represents a sustainable alternative solution to conventional aluminum foil, and to metallized films used in flexible structures, offering opportunities for packaging simplification and higher recyclability.

Ampacet **FauxFoil™** technology is primarily used to mimic the look of aluminum foil and metallized films offering significant key attributes to the flexible packaging produced, such as:

- High reflective silver appearance with high gloss and shine for foil-like aesthetics
- High light blockage allowing to visually hide packaging content
- Softer packaging with no noise
- Eliminates the need to flood print, metallize or laminate with aluminum foil
- Good heat seal properties
- Low carbon footprint

REFERENCES

[1] <http://www.ampacet.com/>