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SIEGWERK

FLEXIBLE PACKAGING

News for Flexible Packaging | Canada & United States (CUSA) Edition

Oxygen Barrier Testing at GIN CUSA

There is an increasing demand in the market for a printable oxygen barrier and GIN CUSA (Canada and United States) began work on such a project in 2015. A coating's effectiveness as an oxygen barrier is determined by measuring the oxygen transmission rate (OTR) at which oxygen passes through a coated substrate. An Ox-Tran machine, manufactured by the company Mocon™, determines the OTR values. In January, an Ox-Tran was installed within GIN CUSA for testing of oxygen barrier coatings on-site.

The OTR is determined by placing a coated film sample in a cell with a continuous flow of pure oxygen gas on one side of the sample and a continuous flow of nitrogen gas on the other. Samples are run in duplicate for increased reliability of results. As oxygen molecules travel through the sample, the nitrogen gas moves them towards a detector which calculates the OTR of the coated sample. The relative humidity (RH) can also be adjusted by introducing moisture into one or both of the gases for more realistic testing conditions. Effective oxygen barriers can take up to a week of continuous monitoring to reach a stable OTR. Previously, coated samples were sent to an external company for OTR testing which could take 1–2 months to get results. The addition of an Ox-Tran machine within Siegwerk's lab enables OTR results to be determined more rapidly for key oxygen barrier coating technologies.

Ox-Tran at GIN Lab located in Des Moines, IA

What is the Global Innovation Network (GIN)

The Global Innovation Network (GIN) develops unique resources, both internally and through external partnerships, to create a true innovation culture resulting in new ink binders and related technology breakthroughs to achieve significant market growth. GIN is present in four countries (India, China, USA, and France) and is mainly composed of chemists. The US-based team has developed a high-level expertise in polymers, UV curable components (photo-initiators, acrylate monomers and oligomers), and renewable materials.

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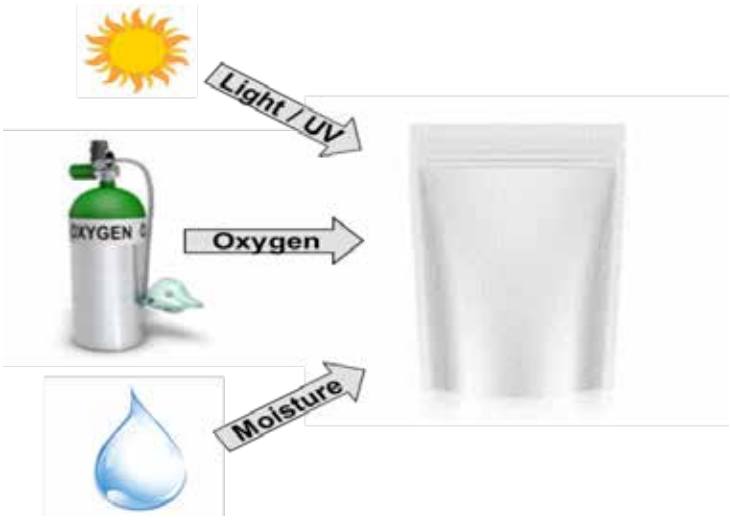
Project Innovation: Developments for Barrier Coatings

Standard packaging materials are susceptible to penetration by external influences such as oxygen, moisture, and UV light which can directly affect materials inside. Specific types of packaging, such as aluminum and opaque films, are currently in use to protect against these external influences. Many printers, however, have shown a desire to print barrier coatings directly on standard packaging materials. Currently, GIN CUSA is working to develop this solution.



There are some traditional oxygen barrier coatings and materials available today, but all have weaknesses relating to diminishing oxygen barrier humidity increases. GIN CUSA began a project for an oxygen barrier in 2015 and has developed three promising coating technologies working with collaborators. One such technology is available from a market partner whose coating forms a dense matrix when printed on films that oxygen is less able to penetrate. This could allow for lower weight or less barrier films to be used thus potentially providing a more economical and sustainable. Although there are limitations as it is not transparent and suffers a weakness to high humidity. Other overprint varnishes and PE laminations can protect the coating from humidity with little impact on the barrier.

GIN CUSA has also partnered with educational institutions and universities to develop oxygen barrier coatings based on technology which enables formation of a torturous pathway. Siegwerk has additionally worked on developing a method to improve upon coatings made with polyvinyl alcohol, a resin known to have good oxygen barrier properties, but weakness to high humidity. The work completed has increased the resistance to higher humidity without degrading the oxygen barrier. All three projects so far have initially shown promising results.New projects in the short-term include developing barrier coatings for UV light and moisture.

The CUSA GIN team will be researching the market to examine what technologies are out there commercially that we could be utilized in coatings in flexible packaging. Initial searches have found limited results in flexible packaging, but there are technologies in other fields (building, automotive, etc.) with the same goal to block moisture – learning how these work and if they can translate to the packaging market is essential to success.