

PEAK NANO FILMS FOR FOOD PACKAGING

CHALLENGES WE SOLVE FOR PACKAGING ENGINEERS

- **Improve Barrier Performance**
Achieve stronger oxygen and moisture barrier, reduce barrier material, or extend shelf life without adding bulk or complexity.
- **Reduce Material Costs**
Decrease or eliminate costly tie layers and expensive resin where appropriate, downgauge while maintaining performance.
- **Remove Materials of Concern**
Design out PFAS and other materials of concern without giving up critical performance.
- **Improve Flex and Puncture Resistance**
Combine toughness and flexibility in one structure instead of choosing between them.

The Problem

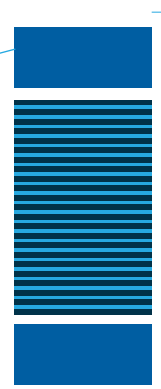
Food brands face a set of packaging demands that are difficult to meet individually and harder to satisfy together. They need oxygen barrier to protect shelf life, flexibility and moisture resistance to survive real-world handling, and increasingly, to design packaging that can go into existing recycling streams or compost. These properties routinely conflict, and hitting all of them with a single material cannot currently be accomplished.

Regulators are escalating the problem: EPR (extended producer responsibility) laws have already [passed in several states](#), directly tying material choice to compliance cost, while performance expectations keep rising to support new packaging formats and technologies entering the market. Brands need packaging science that solves both sides of the tension at once, not another material trade-off.

The Design Ceiling

Most high-barrier food packaging relies on a material called EVOH (ethylene vinyl alcohol copolymer) to block oxygen and protect shelf life. EVOH does that job through its crystalline structure, but is also highly sensitive to water. So packaging teams add other polymer layers around it to handle moisture and flexibility, building up a laminate that solves the barrier problem but creates a new one. Those dissimilar layers are held together with adhesive tie layers, and recycling streams can't pull them apart, so the finished structure is often rejected at a material recovery facility.

Right now, brands have two ways around that. One is to shrink the amount of the non-recyclable material until the structure qualifies as mono-material and can go into standard recycling streams. The other is to switch to biodegradable or compostable materials that break down over time instead of getting recycled at all. Both approaches work, but each also means designing around a limitation rather than solving it.



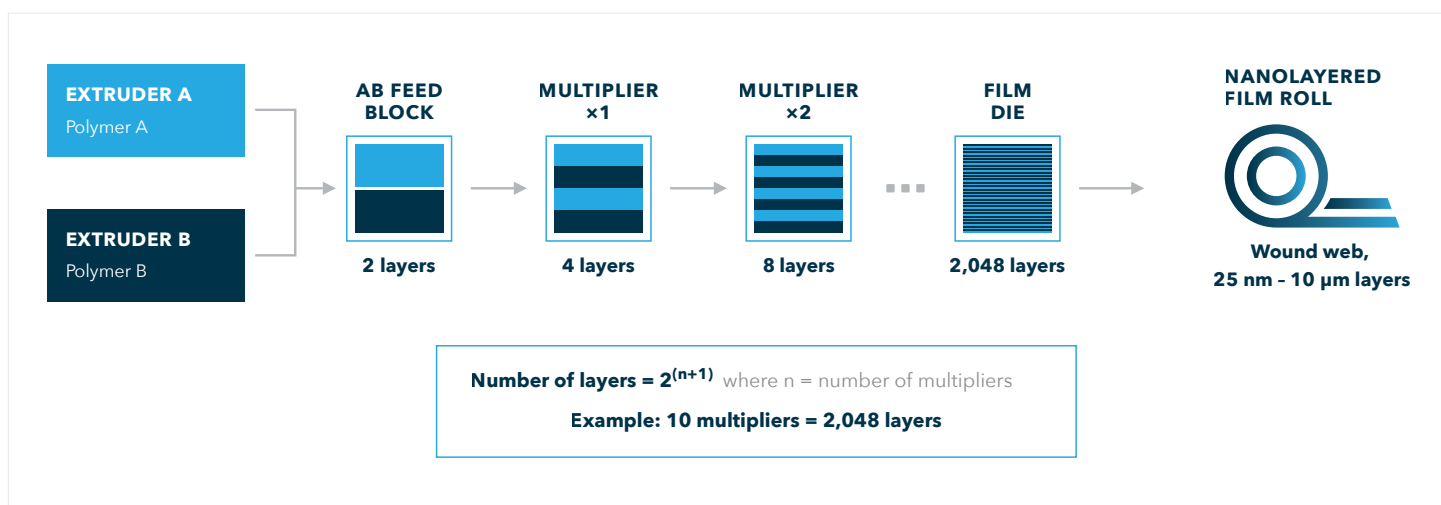
Nanolayered films provide high-barrier packaging without using tie layers

That's the ceiling conventional film design keeps running into. The properties a package needs, like barrier, flexibility, moisture resistance, and recyclability, tend to pull in different directions when you're relying on how a handful of materials behave in bulk. Getting more of one property usually means giving up ground on another.

The Mechanism

Peak Nano's nanolayer coextrusion process takes standard, commercially available polymers and arranges them into hundreds or thousands of ultra-thin layers. At that scale, the polymer's crystals line up in the plane of the film instead of forming the random structures they'd form in a thicker layer or a blend.

That alignment is what gives the film its barrier: a gas molecule trying to pass through has to wind around each crystal rather than slip straight through. So the same resin blocks more oxygen simply because of how it's arranged, not because it's a different material.



This is all about architecture, not chemistry. Peak re-engineers trusted polymers at the nanoscale rather than inventing new materials from scratch, which means the barrier gains don't require trading away flexibility or recyclability the way adding more EVOH does.

Solution in Practice

Peak Nano gives food brands a path to high-barrier packaging that doesn't force the mono-material trade-off. It's engineered and built in the U.S. with allied-nation source materials, removing the import dependency and supply-chain risk baked into much of today's barrier film market.

That path starts with Peak's [Films as a Service \(FaaS\)](#) program, built for the early stage of a project, when a brand is still exploring which material combinations and properties will actually solve their problem. Rather than committing to a resin or a structure up front, brands can test different nanolayer architectures against their real performance targets before running pilot and production scale qualifications in-house with Peak.



Request a FaaS consultation or technical capabilities brief at <https://www.peaknano.com/films-as-a-service> or contact sales@peaknano.com.