



METER
ENVIRONMENT

GORE-TEX, HOUSE WRAP, AND STOMATAL CONDUCTANCE

Want to develop an appreciation for Gore-Tex? All you need is five minutes in a rubber raincoat. But how do you know whether the North Face knock-off you've just purchased in China for a ridiculously low price is Gore-Tex or rubber? If you're a METER researcher, you dash back to your hotel room and clamp a porometer onto the fabric.

The SC-1 leaf [porometer](#) was designed to measure stomatal conductance in leaves. It's typically used by canopy researchers to relate stomatal resistance to canopy attributes like water use, water balance, and uptake rates of herbicides, ozone, and pollutants. Yet, from the beginning, Dr. Gaylon Campbell, the porometer's designer, saw the possibilities: "Give this to someone with only a passing interest in research, a ten-year-old kid for example, and they'll go around the garden and come back with some really interesting observations," he said. "There are lots of questions about what loses water and what doesn't that you can answer with this instrument."

Dr. Campbell was probably thinking the questions would be about organic material—but it hasn't always turned out that way. By putting a wet paper towel on one side of an inorganic material and clamping the towel and the material into the porometer head, you can measure how well water vapor diffuses through the material. Using this strategy, the researcher in China discovered that his raincoat was pretty much impermeable (unlike real Gore-Tex, which is a good vapor conductor). Spotting the fake North Face coat is now a favorite part of METER's canopy seminar. And the coat is not the only leafless item that has been tested. "People will clamp the porometer on just about anything," Doug Cobos, a METER research scientist, admitted. He himself grabbed it when a local contractor brought in a sample of some supposedly unique house wrap.



SC-1 leaf porometer

Siding is supposed to protect a house from the elements, but most building codes now require that houses be wrapped under the siding. House wraps provide a secondary defense against liquid water and increase energy efficiency by preventing drafts. As with raincoats, high-performance house wrap needs to repel water and stop wind while remaining permeable to water vapor.

The practice of applying a sheathing of tar paper under siding is a hundred years old, but in the last fifteen years, high-tech house wraps made from polypropylene in combination with a push towards energy efficiency have made the house wrap market big and competitive. Upstart wraps try to gain market share through innovation and the one brought in by the local contractor came along with an outlandish claim. According to the manufacturer's rep, this plastic wrap would allow water vapor to diffuse out while preventing any from diffusing in. Some builders might have scratched their heads and moved on. Our local man decided to check it out. He brought a sample of the mystical wrap to METER. Out came the porometer, and a quick scientific study of house wrap was born.

Dr. Cobos tested industry standard Tyvek house wrap along with the great one-way pretender. The results? "The vapor conductance of the new material was basically the same, regardless of which side of the material faced wet filter paper," Dr. Cobos said. "And, in fact, the material didn't diffuse well at all. Its conductance was similar to cheap, perforated plastic. It didn't come close to the performance of Tyvek." Ultimately, the newfangled wrap was retested by the manufacturer and taken off the market.

Probably the [porometer](#)'s best and highest use is still in canopy research, but it still gets pulled out to measure whatever seems interesting, organic and inorganic alike. That dovetails with Dr. Campbell's vision of it as a tool for routine use in

canopy studies-and everywhere else. Can you use it on yourself? “Oh sure,” says Dr. Campbell. “People clamp the porometer on their fingers all the time. That’s a quick way to see if it’s working.” He grins. “Maybe you could use it as a lie detector on your kids.”

Discover the [SC-1 porometer](#)