Ceramic Coatings and the new GreenPan™: What's all the noise about?

For several years now, Whitford has been working on the development of ceramic coatings that use no PFOA in the coating process as another option in the growing list of the many products we offer.

We've learned a lot from our own developmental work as well as the extensive testing we've performed on virtually all of the competitive products that have appeared on the market (including the recently launched GreenPan).

To date, we have not found a single such coating which, by Whitford standards, has been suitable to take to market.

What we have learned

While our research continues, here is why we have not yet launched such a product:

1. Ceramic (which is a form of glass) coatings are categorically inferior at releasing food to nonsticks made with PTFE. That's because PTFE has the lowest coefficient of friction of any known solid.

2. The nonstick feature of ceramic coatings has a limited life. Our tests demonstrate that the best ceramic coatings we have examined last only about 15% as long as most of our PTFE-containing nonsticks. Put another way, our nonsticks provide more than six times the life.

3. The surface of the ceramic, which is hard, tends to wear much more rapidly when subjected to industry-standard tests than do PTFE-containing coatings (Whitford Test Methods 199A and 199D, which include the "Tiger Paw" test).

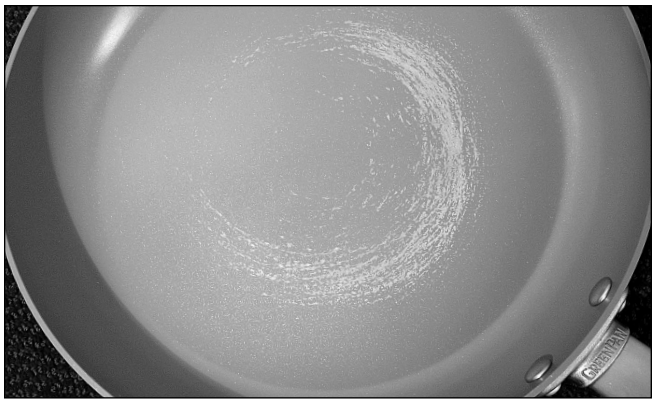
4. Given its glass-like brittleness, the coatings tend to flake or chip off under normal use. This releases tiny shards of glass-like material into the food being cooked, which is then ingested.

The advertising claims

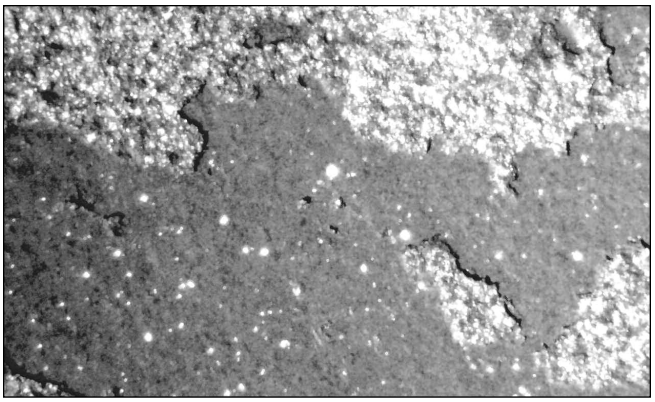
Following is a list of claims made for ceramic coatings with an explanation of the facts:

1. Claim: *"Contains no PFOA".*

Fact: True. But the implication is that therefore other nonsticks <u>do</u> contain PFOA. PFOA is used in small quantities as a wetting agent in making PTFE, the nonstick component of most nonstick coatings. But the PFOA is incinerated in the curing



Severe damage to the interior of a ceramic-coated GreenPan after 11 cycles of the "Tiger Paw" cooking test. Pans coated with Whitford's normal nonsticks typically reach 60-65 cycles before showing similar wear.



Microphotograph of the same GreenPan after 11 cycles shows damage to the glass-like ceramic coating. Shards of the coating have flaked and chipped off, exposing the aluminum substrate below.

process, leaving the consumer protected against exposure.

PTFE manufacturers have already achieved a 95% reduction in the use of PFOA, and are committed to eliminating its use by 2015.

Almost all attempts to find PFOA in nonstick cookware have revealed no trace. Recently, one especially rigorous test revealed a tiny amount, so small it was one-millionth of the "safe" dose estimated for laboratory animals. (That's the equivalent of one drop of water in an olympic size swimming pool.)

2. Claim: *"PFOA is found in human blood".*

Fact: True. But this has nothing to do with cookware, as the EPA and other environmental groups have now acknowledged. Sources are likely to be stain repellents in carpets, upholstery and other such applications that use PFOA but do not pass through the high-temperature "curing" phase (which destroys it) that cookware and bakeware do.

3. Claim: *"Contains no Teflon® (PTFE)".*

Fact: True, but essentially meaningless. Since 1938, PTFE has been used extensively in thousands of applications, from medical devices to cookware, and there has never been a reliable report of adverse long-term effects in humans.

4. Claim: *"PTFE, when taken to extreme temperatures, releases noxious fumes".*

Fact: True. But, there are no noxious fumes released until the temperature exceeds 650˚F, which far exceeds cooking temperatures. Should this happen, the only symptom ever reported is "polymer-fume fever", temporary flu-like symptoms that disappear in 24-36 hours. Note: There are only a few reported cases of this in more than 50 years of public use of nonstick coatings.

5. Claim: *"PTFE fumes can be harmful to pet birds".*

Fact: True — under conditions of extreme overheating (above 650˚F). Birds have sensitive lungs. But equally harmful would be the fumes from bacon, butter, or most foodstuffs cooked at such temperatures. In fact, even before reaching 650˚F, the bacon fat in a pan would have spontaneously ignited, bursting into flames — far more dangerous to both birds and their owners.

6. Claim: *"Ingested flakes of PTFE are harmful to your health".*

Fact: False. PTFE is one of the most inert materials known. It is unaffected by any body fluids, even the powerful acids in the human stomach. Any that might be ingested (an unlikely circumstance) would pass harmlessly through the digestive system. We do not believe one could say the same for the glass-like shards from ceramic coatings.

7. Claim: *"Ceramic coatings don't scratch".*

Fact: False. The opposite is true, as the cooking tests run have proven (see photos). The coatings are hard, but they do scratch and chip.

8. Claim: *"Superior nonstick release: surface does not break down or wear over time."*

Fact: False on both counts. Compared to conventional nonsticks, the GreenPan release wears off quickly and the surface breaks down quickly under standard cooking tests (take another look at those photos).

9. Claim: *"Ceramic coatings use a nano nonstick technology".*

Fact: True. So do conventional nonstick coatings and even house paint. "Nano" means one-billionth of something, so a nanometer is one-billionth of a meter. Pretending that the "nano" aspect is something new and different is stretching the truth.

10. Claim: *"Ceramic coatings are safe to 850˚F".*

Fact: True, but meaningless. Nobody cooks at temperatures like that. In addition, most cooking authorities recommend cooking at no more than 350˚F-400˚F, less than half the 850˚F claimed.

R&D at Whitford continues on ceramic coatings, and when we develop one that does not suffer from the disadvantages listed above, we'll be happy to take it to market.

Until then, the PTFE-based coatings we offer are so superior to the ceramic coatings now on the market that we will continue to improve what has been and continues to be a better nonstick product.

For further information, please contact Whitford.

Whitford

47 Park Avenue, Elverson, PA 19520

Tel: (610) 286-3500 • Fax: (610) 286-3510 • sales@whitfordww.com