

Non-stick “green” cookware: Does it measure up to manufacturers’ claims?

Charles C. Broz,
College of Education and Technology
Eastern New Mexico University

D. Christopher Taylor,
Conrad N. Hilton College
University of Houston

and

Jonathan Barr,
College of Fine Arts
Eastern New Mexico University

ABSTRACT

For the past decade, there has been much controversy over the dangers of non-stick polytetrafluoroethylene (PTFE) coated cookware. In response to the demand for a new non-stick product, manufacturers have developed environmentally friendly, non-PTFE alternatives. These “green” pans are supposedly non-stick and exceptionally durable. However, laboratory testing of these pans, as well as customer reviews, suggests a lack of credibility to such claims. This experiment was conducted to replicate television cooking demonstrations for non-stick cookware. A durability test was also conducted to assess the hardness of the ceramic coating.

Keywords: Consumer testing; Non-stick cookware; PTFE

INTRODUCTION

For the past decade, there has been much controversy over the dangers of Teflon® coated cookware, and its correlation with birth defects in laboratory animals (America’s Test Kitchen, 2009). In 2005, a law firm in Florida sued Teflon® manufacturer DuPont for

covering up the fact that Teflon® contains dangerous substances (Sissel, 2005). The chemical responsible for the danger is perfluorooctanoic acid, (PFOA), which is correlated with several types of cancer. The Environmental Protection Agency is asking for an end to PFOA use by the end of 2015 (Szalavitz, 2006). In response to this demand for a new non-stick product, several cookware manufacturers have developed “green” pans which are supposedly non-stick, as well as environmentally friendly, and contain no harmful substances. However, laboratory testing as well as customer reviews of these products would indicate that many are poor performers across a range of criteria. One pan in particular, which claims the ability to fry foods with no oil, was tested for performance over the course of this study.

LITERATURE REVIEW

Since the inception of polytetrafluoroethylene (PTFE), marketed commercially as Teflon®, this chemical coating has been a staple in the American food industry, as well as in the consumer kitchen. Originally hailed as the “most slippery material in existence,” PTFE has held a prime position among non-stick cookware since the 1960s (DuPont, 2015). Unfortunately, despite its culinary applications, the manufacture of PTFE has been associated with toxic substances potentially harmful to both animals and humans (Environmental Working Group, 2009). Most notable of these toxins is PFOA, otherwise known as C-8 (Sissell, 2003). The Environmental Protection Agency has serious concerns about PFOA, due to the fact that it does not break down in the environment, and can be found in blood samples of over 90% of U.S citizens due to exposure from long-term and widespread use in chemical production (Scheer, 2007). In past studies, PFOA has been correlated with cancers of the pancreas, liver, mammary gland, and testes (EPA, 2002; EPA, 2003). As of this writing, researchers are still debating the relative danger of this substance (EPA, 2015). However, much negative press has certainly impacted the popularity of PTFE-coated cookware.

Such controversy has created a market segment for non-PFOA substitutes: coatings that can bond to metal cookware, provide a low-friction surface, and be durable enough to withstand the rigors of daily use. These coatings primarily fall under two categories: ceramic and silicone copolymer. Of the two, ceramic is the most common, and is typically applied to an aluminum or base metal vessel through a process whereby “ceramic like” particles are suspended in a solvent, and sprayed onto the surface of the pan. The coating is then hardened through the application of heat, and slowly cured in an industrial oven (Whitford, 2012). While less frictionless than their PTFE counterparts, ceramic non-stick coatings are touted as being harder than Teflon®, and able to withstand higher temperatures (Whitford, 2012).

Copolymerized silicone based non-stick coatings are an extension of silicone alkyd resins developed in the 1950s. As silicone is very resistant to chemical and corrosive damage, as well as to high heat, it has proved a stable and trusted method of coating aluminum cookware (Witucki, 2003).

Non-PTFE cookware is readily available on the market, and has traditionally been marketed as “green” cookware. Manufacturers’ nomenclature commonly lists “PTFE free” among supposed attributes of the various products. Many of the larger producers of cookware are currently advertising a “green” non-stick offering, and several small companies have surfaced to ply their wares amid this trend. Despite the many benefits promised by the makers of these products, consumer organizations have published numerous warnings about the performance of same. Laboratory testing of “green” non-stick cookware has resulted in reports of poor performance across a range of criteria. In addition, a review of consumer watch websites reveals frequent customer complaints mainly concerning sticking of foods during the cooking process, and non-durable, chipping, or peeling coatings.

In 2009, America’s Test Kitchen put several “green” non-stick skillets through laboratory trials in the September issue of their publication *Cook’s Illustrated*. A year later, the Good Housekeeping Research Institute conducted a similar study on this type of non-

stick cookware. Both studies concluded that various popular brands of “green” cookware are lacking in many categories.

Both Good Housekeeping Research Institute (GHRI) and America’s Test Kitchen (ATK) rated the Scanpan Professional Ceramic Fry Pan as one of the best of the “green” pans tested. This product is a compressed aluminum skillet with a ceramic titanium coating. The only negative remark by ATK was that metal utensils left scratches in the surface (ATK, 2009). However, GHRI was disappointed with the pan’s non-stick surface, rating it as not “as slick” as other cookware (GHRI, 2010).

Next on the list was the GreenPan Thermolon non-stick frypan. This hardened anodized aluminum pan has a “Thermolon” ceramic non-stick finish. America’s Test Kitchen reported that the product cooked some proteins unevenly, failing to release. In addition, the coated surface scratched easily and became discolored during testing (ATK, 2009). An identical pan was tested by GHRI, who found the surface conducted heat very poorly and unevenly when used on electric ranges (GHRI, 2010).

Another ceramic coated anodized aluminum pan tested by both laboratories was the Cuisinart Green Gourmet Skillet. ATK found that this cookware allowed eggs to stick to the sides of the vessel, and tended to create burned edges on steaks. GHRI claimed that the non-stick surface stained easily, and required an abrasive cleaner to remove. This is a potential issue, as abrasives can be highly damaging to non-stick coatings (GHRI, 2010).

The only silicone copolymer-coated skillet reviewed by both laboratories was the Earth Pan Non Stick Sandflow hard anodized aluminum skillet. This vessel was rated as having a substandard non-stick coating by GHRI. America’s Test Kitchen found that the pan also displayed difficulties with releasing food items. In addition, after only a few days of testing, ATK reported visible scratches and significant deterioration of the copolymer surface (ATK, 2009).

Finally, the “green” skillet tested solely by America’s Test Kitchen was the Classicor Go Green non-stick skillet. This ceramic coated

stainless steel pan was the poorest performer of the vessels tested. ATK found that after preparing only scrambled eggs, the non-stick surface deteriorated, and then began to chip off. In addition, severe scratches were visible from fairly light usage (ATK, 2009).

From a consumer's standpoint, the various "green" products fared equally poorly. All of the pans as tested above have received negative customer reviews on websites, including Whirlpool Forums, Amazon, and Apartmenttherapy.com. For example, one customer reported that the Scanpan Professional Ceramic fry pan has "scratched and [is] looking very abused" after only six months of use. The same product was replaced multiple times by another customer, due to surface degradation, scratches and constant sticking of foods during the cooking process (Whirlpool, 2011).

The non-stick surface of the GreenPan fry pan was also rated poorly by two customers who specifically mentioned treating the pans carefully. One customer stated that with careful washing, and treating the pan "with kid gloves," the coating failed after six months of use (www.apartmenttherapy.com, 2009). Likewise, another customer mentioned careful treatment, and only using the pan on low heat, but still having difficulty with loss of the non-stick coating after only a few months (Amazon.com, 2010).

The Cuisinart GreenGourmet Skillet was rated very poorly by one consumer who states familiarity with use and care of non-stick cookware. Despite careful use and the fact that it was only used for egg cookery, the pan's surface "began bubbling up and flaking off" after two months of use (Amazon.com, 2011).

Earthpan's Nonstick Sandflow Skillet was rated poorly by customers as well. One reviewer complained of chipping of the non-stick coating, and food sticking after three months of light use (Amazon.com, 2012). Negative reviews from Wayfair.com include the non-stick finish completely coming off (2010), sticking and staining (2011), the bottom of the pan changing color (2013), and sticking and un-removable staining (2014).

Finally, the Go Green non-stick fryer by Classicor was rated by an unsatisfied customer on Amazon.com. Similar to the Earthpan, this fryer became permanently stained, and lost its non-stick coating after only light use on medium heat (Amazon, 2009).

Despite the numerous negative reports surrounding “green” non-stick cookware, both in the laboratory and the consumer kitchen, products continue to be manufactured, with new models appearing frequently. Such is the case with the OrGreenic line of non-stick cookware. Heavily advertised on television, this line of products, especially the non-stick skillet, is reputed to possess an almost frictionless surface that is nearly impossible to damage. The television advertisement depicts a product spokesperson swirling two-inch diameter rocks around the inside of the pan. In the next frame, a perfect sunny-side-up egg is shown also swirling, apparently with no fat or visible lubrication (OrGreenic, 2011). A primary selling point of the OrGreenic pan is that foods can be cooked with absolutely no oil or fat added to facilitate the cooking process. This would allow consumers to enjoy a much healthier diet, as no excess lipids are introduced to the various dishes. The advertisement replays multiple shots of fried eggs (sunny-side and omelets) as well as breaded chicken, all cooked to seeming perfection with no cooking fat whatever. Thus, in the vein of the laboratory tests discussed above, it was the intention of this study to test the OrGreenic non-stick skillet by attempting to replicate the claims of the television advertisement.

METHODOLOGY

The OrGreenic pans that were tested were ten-inch, anodized aluminum sauté pans, with a green ceramic coating on the cooking surface. Manufacturers claim that the pan is able to “fry” foods with no fat-based cooking medium, provided that the initial instructions for seasoning the pan are followed. The advertisement video for this product demonstrates the non-stick properties of the pan by showing an egg being fried sunny-side-up, fish being seared, and breaded chicken being perfectly browned, all with no oil. In addition, the

durability of the pan was demonstrated by filling the pan with approximately two-inch diameter rocks, which were then swirled over the non-stick coating several times leaving no visible scratches. To test the accuracy of these claims, this research concentrated on attempting three of these demonstrations.

All variable experiments were conducted using three newly purchased, identical, OrGreenic 10” non-stick fry pans. A Bosch sealed-top free standing electric oven/range (HE57282U) was utilized for all cooking processes. The research was carried out in a controlled environment in a kitchen laboratory by researchers experienced with the testing of cooking equipment. The entire experiment was photographed, and all temperatures were monitored with calibrated digital thermometers.

Seasoning the Pans: According to the provided instruction sheet, seasoning the OrGreenic fry pan consists of the following steps: First, a light coating of vegetable oil is spread over the cooking surface; second, the pan is placed on a stovetop over medium heat, and removed from heat when the oil begins to smoke; third, the pan is allowed to cool completely, and to be cleaned of excess oil. After this protocol has been followed, the pan supposedly can be used to cook any items with no fat-based cooking medium. All three of the OrGreenic 10” non-stick fry pans used in this research were seasoned using this method before testing began.

Test 1: Cooking sunny-side-up eggs with no oil.

Control Experiment: According to The American Culinary Federation (2006), the appropriate method for frying an egg (sunny side up) is to cook it in hot fat over medium heat until the whites are set. The pan is then tilted to allow the hot fat to coat and cook the yolk to desired doneness. As a control for the egg experiment, this traditional method was performed with a Johnson-Rose 63528 Platinum Pro fry pan, with 1 tablespoon of unsalted butter. The pan was placed over a burner at medium heat, and allowed to pre-heat for 2 minutes. A grade A large chicken egg was then poured into the pan from a bowl. The egg whites were allowed to set, and then the pan was tilted to allow the yolk to be basted by the hot fat. The

finished egg was then photographed in the pan. The entire cooking process took 3 minutes and 30 seconds, minus pre-heating (see Figure 1).



Figure 1

Variable Experiment: An OrGreenic 10” non-stick fry pan was placed on a burner, and allowed to pre-heat for 2 minutes. Again, a Grade ‘A’ large egg was introduced into the pan. The egg was allowed to cook for 3 minutes and 30 seconds, and then photographed in the pan. This variable experiment was conducted a total of three times, with three identical OrGreenic 10” non-stick fry pans.

Test 2: Browning (and fully cooking) breaded chicken with no oil.

Control Experiment: According to the American Culinary Federation (2006), the standard breading procedure consists of dredging a product with flour, dipping it in eggwash, and finally coating it with breadcrumbs. The same authority describes the standard process for frying chicken: Heat oil in a skillet to 350 degrees F. The oil should come ½” up the sides of pan. Chicken should be cooked in the hot oil on one side for 5 minutes. The chicken should then be turned and cooked on opposite side for 7 minutes, for a total cook time of 12 minutes (ACF, 2006). The control experiment was conducted using a 13” Johnson-Rose 4753 Crown Select induction fry pan. The pan was placed over medium heat, and vegetable oil was added to a depth of ½ inch. The pan was heated until the oil reached 350 degrees F. A chicken leg was breaded using the procedure as recommended above, and placed in the oil when the target temperature was reached. The chicken leg

was cooked for a total of 12 minutes, and turned once. The leg was checked for internal temperature, and then photographed in the pan (see Figure 2).



Figure 2

Variable Experiment: The chicken leg was floured, egg-washed, and breaded with plain ground bread crumbs, as described in the standard breading procedure above. Again the pan was placed over medium heat, and allowed to heat up until reaching 350 degrees F (2 minutes 33 seconds). Surface temperature of the pan was measured with a Bonjour E2062035326 infrared thermometer. The breaded chicken leg was placed in the pan, and was given a quarter turn after three minutes. Because there was no cooking medium, the only cooked areas were those which were in direct contact with the surface of the pan. This process was repeated four times for a total cooking time of twelve minutes. Finally, the internal temperature was taken with the instant read digital thermometer, and the chicken leg was photographed in the pan. This variable experiment was conducted a total of three times, with three identical OrGreenic 10” non-stick fry pans.

Test 3: Swirling rocks over the non-stick coating with no visible damage.

Control Experiment: The OrGreenic television advertisement very specifically shows a spokesperson for the product swirling six rocks (approximately two inches in diameter) around the inside of the pan for several rotations. This action had no visible impact on the integrity of the pan’s surface, nor of its non-stick abilities. In fact, the next frame of the advertisement shows a fried egg moving about the pan (presumably the same pan) with frictionless ease.

The surface of an unused pan was photographed using a Dino Lite table top digital microscope to provide a close up image of the OrGreenic non-stick surface in pristine condition (see Figure 3).



Figure 3

Variable Experiment: After the cookery experimentation had concluded, six two-inch-diameter rocks were procured, cleaned of excess dust and debris, and placed in one of the three pans to test the ability of the ceramic surface to withstand scratches, as well as its overall durability. The rocks were swirled around the interior of the pan for ten seconds. The pan was then wiped clean with a soft, damp cloth. This surface was also analyzed and photographed with the Dino Lite microscope.

Plausibility of the Advertisement: Despite any and all results (as discussed below), the researchers conducted a series of experiments by which to test if the OrGreenic 10” non-stick fry pan was indeed capable of producing food items exactly as pictured in the advertisement. Due to the fact that the manufacturers made no mention of specific temperatures or cooking times for the items produced, it seemed indicated that experiments be performed outside the range of traditional or even practical, cooking procedures. In this endeavor, tests were conducted to produce both food items: a sunny side up egg able to swirl effortlessly in the pan; and a breaded chicken leg, browned evenly on all sides, and at an internal temperature safe for consumption.

Two experiments were conducted to reproduce the egg as seen in the video. One egg was cooked on the lowest setting available on the range in question, and was allowed to cook for as long as was necessary to produce desired results. The second method was to

separate the egg, and cook and set the whites prior to adding the yolk.

Three experiments were conducted to recreate a breaded chicken leg identical to that shown in the advertisement. The first method was to set the temperature of the range to its second lowest setting (± 250 F), and to allow the chicken leg to cook slowly, turning it as necessary for even browning for a full 60 minutes. The other two tests involved placing breaded chicken legs in pans, and putting the entire pans into the oven to finish the cooking process. One leg was placed in the oven at 350 degrees F. The second was placed in the oven at 400 degrees F. Both chicken legs were cooked for 40 minutes.

RESULTS

Test 1 Variable Experiment: Once the egg was introduced into the pan, it was noted that the very edges of the egg whites began to lift up from the non-stick surface. This process began after the egg had been in the hot pan for 30 seconds. After the 3 minute 30 second cook time, the egg whites were set enough to move the egg around the pan without damaging it. However, the weight of the yolk prevented such free movement, creating small areas in which the underside of the yolk was sticking to the pan. Attempts to dislodge the egg resulted in breakage (see Figure 4). This breakage occurred in all three pans identically, in each of the no-oil tests. Thus, allowing the egg to set enough for ease of movement around the pan, also allowed protein on the underside of the egg to stick, negating the frictionless qualities of the non-stick surface.



Figure 4

Test 2 Variable Experiment: The control experiment with the chicken leg resulted in a typical, well-browned, and safe to consume product. However, the cooking medium (vegetable oil) was primarily responsible for such quality. Because the experimental pans were used with no oil, contact with the surface of the pan itself was the only means by which heat could be conducted from the burner to the target. The cooking medium had the ability to conduct heat nearly half way up the sides of the target product, and also was able to cook evenly around the irregular surface of a breaded cut. Without this medium, the breading tended to burn, and while the leg was turned often, this experiment produced a product that was unbrowned, and undercooked (see Figure 5). The twelve minutes of total cooking time as recommended by ACF for breaded chicken did not produce adequate results using this experimental method. Please see Table 1 for weights, cook times, and internal temperatures of poultry testing.

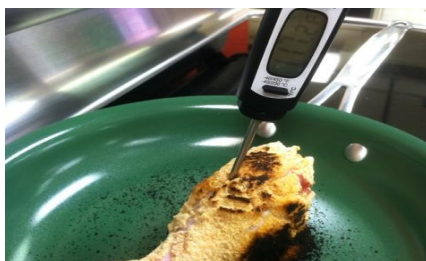


Figure 5

Test 3 Variable Experiment: This experiment resulted in a critical failure of the product. The non-stick ceramic surface of the OrGreenic fry pan is in no way scratch proof, or otherwise impervious to damage by abrasive agents such as rocks. The test resulted in numerous deep scratches, as well as pits and chips where portions of the ceramic were gouged by such treatment. This type of demonstration is contraindicated, as it will almost certainly result in cookware damaged beyond use (see Figure 6).

Plausibility of the Advertisement, Results: Ignoring conventional cookery, attempts were made to exactly recreate the products as demonstrated in the advertisement. As cooking eggs with no oil repeatedly resulted in sticking and broken yolks, longer/lower

cooking methods were employed to some success. One egg was cooked at the test range's lowest setting for 35 minutes. This resulted in the whites setting completely, and lifting away from the non-stick surface of the pan. However, the weight of the yolk still created small areas of sticking, and would release the egg for only seconds before sticking again.

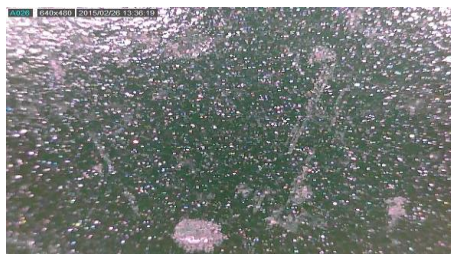


Figure 6

The second attempt required an egg to be separated, and the whites to be cooked to doneness before adding the yolk on top. This allowed the whites to completely cook without the weight of the yolk causing areas of sticking, and resulted in a sunny side up egg that could be swirled around the pan as demonstrated in the advertisement (see Figure 7). Despite such proof of plausibility, this method resulted in a very undercooked yolk (it being insulated from direct heat by the egg whites) as well as being impractical in any sort of realistic cooking application.

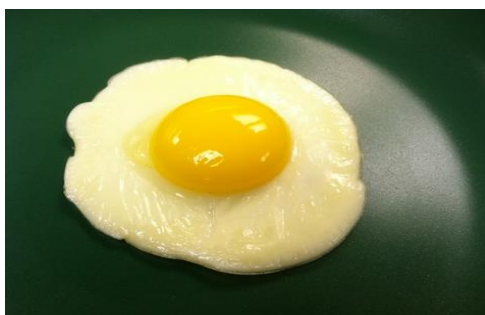


Figure 7

Recreating the breaded chicken demonstration tested methods both practical and impractical. Cooking the chicken leg on the stovetop on very low heat (+/- 250 F) for a full 60 minutes did indeed result

in a product that was safe for human consumption (171 F). However, the majority of the breading was undercooked, and the overall appearance of the product was unacceptable (see Figure 8).



Figure 8

The final two methods designed to recreate the breaded chicken as demonstrated were simply to place the breaded legs in the pans, and to place the pans in a hot oven. According to the Illustrated Good Housekeeping Cookbook (a popular consumer resource), chicken pieces should be baked at 400 degrees F, for 40 minutes (Coulson, 1980). Thus, the first chicken leg was placed in a 400 degree oven for 40 minutes. This process resulted in a final product that was browned (albeit slightly dark) and cooked to a safe internal temperature of 179 degrees F (see Figure 9). In an attempt to create a more golden color on the breading, the second test involved reducing the oven temperature to 350 degrees F. The rest of the experiment was identical to the first, including the 40 minute cooking time. This leg resembled more closely the product as shown in the advertisement. It also had reached an appropriate internal temperature for safe consumption (174 F). See Figure 10. While it can certainly be argued that these final two tests produced chicken legs resembling those in the commercial, the quality of the final product had little, if anything, to do with the cooking vessel. Chicken can be successfully roasted/baked at oven temperatures for just under an hour regardless of the cooking surface employed. The fact that consumable and attractive food items were the result of this experiment neither proves nor disproves the claims of the manufacturer.



Figure 9



Figure 10

Table 1: Results of Poultry Experiments

| Cooking Method | Wt. (oz) | Final Temp. (F) | Cooking Time |
|-----------------------|-----------------|------------------------|---------------------|
| Control (Oil Fry) | 4.7 | 169 F | 12 minutes |
| Variable 1 | 4.8 | 126 F | 12 minutes |
| Variable 2 | 5.3 | 120 F | 12 minutes |
| Variable 3 | 5.5 | 117 F | 12 minutes |
| Oven 350 F | 5.3 | 174 F | 40 minutes |
| Oven 400 F | 5.1 | 179 F | 40 minutes |
| Rangetop | 5.2 | 171 F | 60 minutes |

DISCUSSION

While a range of “green” non-stick pans are available to consumers today, including the Classicor Go Green, the Cuisinart GreenGourmet, the EarthPan and the GreenPan. All of these products fail to meet standards required by the laboratory, the

consumer kitchen, or both. One such product, the OrGreenic non-stick pan has been advertised heavily in the media, and touts a non-stick surface that is supposedly scratch proof, and can cook food with no oil. Given the obvious health benefits associated with low-fat cooking, as well as the lack of PFOA in the cookware, the researchers considered this to be a worthwhile product to test. However, like all the other similar products tested by America's Test Kitchen and the Good Housekeeping Research Institute, many of the claims proved false. Durability testing resulted in deep pitting and severe scratching of the ceramic cooking area, and the oil-free cooking tests resulted in badly stuck-on and burned foods. The researchers were able to recreate some of the claims of the OrGreenic manufacturer, and duplicate the food products as shown in the advertisement. However, to do so required either radically impractical methods, or methods that have little or nothing to do with the actual makeup of the cooking vessel. In addition, some of the claims were proven to be utter fabrications.

Although avoiding use of PFOA in the manufacture of modern cookware is laudable, the current grade of ceramic coatings and silicon copolymer sprays are seemingly not durable enough to maintain a frictionless surface amid the rigors of consumer cookery, let alone those of the industry. The above litany of online complaints and laboratory trials is a testimony to this fact. A truly "green" Teflon® substitute has yet to be developed to fill this need. Likewise, the notion of being able to remove excess fats from daily food consumption is a worthy pursuit, but cooking in a vessel free of any lubrication or medium would appear as impossible as it sounds. The OrGreenic non-stick fry pan can safely be added to the list of other poorly performing cookware in this niche market. Consumers should beware of improbable sounding claims.

REFERENCES

- Amazon.com. (2009). Customer review. Retrieved from www.amazon.com/review/R16H6MKIBC8NMA.
- Amazon.com. (2010). Customer review. Retrieved from www.amazon.com/review/R7F9KRDHF3QHC.
- Amazon.com. (2011). Customer review. Retrieved from www.amazon.com/review/R361GCSN2HMUHY.
- Amazon.com. (2012). Customer review. Retrieved from www.amazon.com/review/RK0T6EBHG0MR.
- American Culinary Federation. (2006). Culinary fundamentals. New Jersey: Pearson.
- America's Test Kitchen. (2009, September 1). Green skillets. Cook's Illustrated. Retrieved from https://www.cooksillustrated.com/equipment_reviews/1190-green-skillets.
- Apartmenttherapy.com. (2009). Customer review. Retrieved from www.apartmenttherapy.com/worth-it-or-not-green-nonstick-93765.
- Coulson, Z. (1980). The good housekeeping illustrated cookbook. New York: Hearst.
- DuPont. (2015). History of Teflon®. Retrieved from www2.dupont.com/Teflon/en_US/products/history.html.
- Environmental Protection Agency. (2002). Revised draft hazard assessment of perfluorooctanoic acid and its salts. U.S. EPA Administrative Record AR226-1136.
- Environmental Protection Agency. (2003). Preliminary risk assessment of the developmental toxicity associated with exposure to perfluorooctanoic acid and its salts. Attachments to EPA/OPPT Nomination of Perfluorinated Compounds.
- Environmental Protection Agency. (2013). Perfluorooctanoic acid (PFOA) and its fluorinated telomers. 2013 Annual Progress Reports.
- Environmental Working Group. (2009). Petition to the united states consumer product safety commission to require warning labels on cookware and heated appliances bearing non-stick coatings. EWG Petition to CPSC Re: Teflon®-Coated Products.
- Good Housekeeping Research Institute. (2010). Customer review. Retrieved from www.goodhousekeeping.com/product-reviews/cooking-tools/cookware-reviews/scanpan-professional-ceramic-titanium-nonstick-cookware-403.
- Good Housekeeping Research Institute. (2010). Customer review. Retrieved from www.goodhousekeeping.com/product-reviews/cooking-tools/cookware-reviews/scanpan-professional-ceramic-titanium-nonstick-cookware-403.

- reviews/cooking-tools/cookware-reviews/cuisinart-green-gourmet-nonstickcookware-397.
- Good Housekeeping Research Institute. (2010). Customer review. Retrieved from www.goodhousekeeping.com/product-reviews/cooking-tools/cookware-reviews/earth-pan-hard-anodized-sandflow-nonstickcookware-396.
- Good Housekeeping Research Institute. (2012). Customer review. Retrieved from www.goodhousekeeping.com/product-reviews/cooking-tools/cookware-reviews/greenpan-rotterdam-thermolon-non-stick-open-fry-pan.
- National Restaurant Association Educational Foundation. (2012). Cooking requirements for specific types of food. ServSafe 6th Ed. Chicago: NRAEF.
- OrGreenic. (2011). Orgreenic kitchenware fry pan. Retrieved from www.youtube.com/watch?v=Ziu9oS7JPgA.
- Scheer, R. (2007). DuPont's not sticking with PFOA. *The Environmental Magazine*, 18(3), 24.
- Sissell, K. (2003). EWG seeks warning labels for Teflon® cookware. *Chemical Week*, 165(19), 67.
- Sissell, K. (2005). Lawsuit seeks compensation for DuPont's Teflon® customers. *Chemical Week*, 167(25), 37.
- Szalavitz, M. (2006). Are non-stick pans dangerous? Sticking to the facts on non-stick pans. *Psychology Today*, 39(4), 54.
- Wayfair.com. (2010-2014). Customer review. Retrieved from www.wayfair.com/EarthPan-Hard-Anodized-Aluminum-10-Piece-Cookware-Set-80963-ETH1012.html.
- Whirlpool.com. (2011). Customer review. Retrieved from forums.whirlpool.net.au/archive/1650305.
- Whitford. (2012). Sol-Gel 'ceramic' coatings. Product Knowledge Network Newsletter II.
- Witucki, G. (2003). The evolution of silicon-based technology in coatings. Form No. 26-1208-01, Dow Corning Corporation.