Substrate Options

In the twentieth century, heat-resistant glass and glass-ceramic materials were developed. Like ceramic materials, they meet the need for attractive ware used for mixing, cooking, serving and storing. Major features are attractiveness, one-dish convenience, and inert, non-porous surfaces that won’t absorb food odors and flavors.

While most are very rugged, they can break under impact. However, some glass, ceramic and glass-ceramic cookware manufacturers warranty their products against thermal breakage, and offer free replacement should the ware break in normal use within the warranty conditions.

Heat-resistant glass cookware may be made of clear or tinted transparent material or opaque white (commonly called "opal" glass). Glass-ceramic cookware may be white or transparent and tinted. Ceramic cookware is available in white or a variety of colors.

Properties of Glass, Ceramic and Glass-ceramic

Heat-resistant glass can be used for storing, cooking and serving. Some pieces can be used on the rangetop, while others are suitable only for the oven. Those designed for baking can be taken from the refrigerator and put into preheated ovens after the utensil reaches room temperature. As a rule, they should not be used on the stove top or under the broiler. Heat-resistant glass stove top products should usually be used with a wire grid on an electric range but should never be taken from the refrigerator or freezer and placed directly on a hot stove's element. Similarly, sudden cooling may be harmful to glass cookware. Hot glass cookware should not be allowed to come into contact with wet countertops, nor should they be placed in water while they are still hot.
Some ceramic cookware is made of heat-resistant materials that can go from the freezer to a hot oven or microwave. None is suitable for top-of-range or broiler use. Like glass cookware, ceramic cookware holds heat for a long time while providing the additional benefit or an attractive serving dish. Ceramic cookware is available in a wide variety of shapes, colors and designs.

Among the most thermally shock-resistant materials ever developed by man, glass-ceramic is a true spaceage material. It was first used in rocket nosecones because the glass-ceramic material could take the extreme temperature changes encountered in their supersonic flight from the earth's surface into outer space and back. Glass-ceramic cookware offers wide food preparation versatility. It can be used for stove top cooking and is excellent for roasting, broiling or baking—in the conventional or microwave oven. It can go directly from the freezer to the stove top, broiler or hot oven. Glass-ceramic cookware can be immersed, hot off the stove, into sudsy dishwater for easy cleanup.

Manufacturing

Glass is a non-crystalline material manufactured by melting a combination of raw materials including sand, soda ash, limestone, feldspar and borax. The glass used in cookware is normally melted in a large refractory furnace or tank at temperatures exceeding 2000° F. A small portion of the molten glass is drawn out of the tank and is blown or pressed into a mold. The mold essentially cools the glass, causing it to solidify. Following forming, the glass article is cooked to room temperature on a schedule specifically designed to insure the development of the desired heat-resistant characteristics.

Glass-ceramic is a special glass composition that is melted and formed like heat-resistant glass. Following forming, the articles are subjected to a special heat-treating schedule resulting in the development of a fine crystalline structure throughout the article. It is this crystalline structure (which may be transparent or opaque) that gives the glass-ceramic its unique performance characteristics.

Ceramic cookware is manufactured from a mixture of water, clays, fluxing minerals (often feldspar) and finely ground sand. The particular forming methods depends largely on the water content of the mixture. A high water content (relatively liquid solution) permits casting of the ware in a mold. Lower water content results in a plastic mass that can be forced into the desired shape by a variety of methods.

After forming, the ware is dried and fired (subjected to temperatures in excess of 2000°F) in a ceramic kiln to bond the components of the "body" together. Following this initial firing, the surface of the ware is coated with a glaze that, upon firing in a second ceramic kiln, develops a smooth nonporous surface much like glass. For glass and ceramic cookware with nonstick interiors three layers of nonstick coating are applied to specially prepared interior surfaces and then cured at approximately 800°F.
Use and Care

Ceramic, glass and glass-ceramic materials are excellent retainers of heat. Baking dishes and casseroles made of these materials hold the food’s heat long after it is removed from the oven. It is usually recommended to use these items at slightly lower oven temperatures for a shorter length of time because the covered cookware continues to cook foods even after it’s been removed from the oven. A rule of thumb is to reduce the recommended oven temperature about 25°F (14°C).

Check the manufacturer’s recommended care and use instructions before using any glass, ceramic and glass-ceramic bakeware. These items are usually cleaned with hot sudsy water and soaked if food has been burned on the item. Avoid knives, sharp kitchen tools, scouring pads and abrasive cleaners so that surfaces retain their original smooth finish. This is especially important for ovenware with nonstick interiors. Nylon and plastic scrubbers are acceptable for stubborn sticking problems.