CHAPTER III

LITERATURE REVIEW

Michael C. Madden *et al.* (1978) studied the construction of model human female breasts consisting of the thin membrane surrounding a silicone gel. These models were combined with steel spheres to simulate a tumor-containing breast and were presented to subjects as means of determining their ability to detect the artificial tumors as a function of tumor size. Silicone resins, manufactured by General Electric, were selected for molding a model. The gel used for the interior was RTV 619 and the skin was fabricated from RTV 7100. For curing RTV 7100, 15 % by weight of toluene was added to reduce the resin's viscosity. Then, heat treatment was performed at 70 °C for 2 hours to cure the gel. Moreover, results of compression load-deformation test for the three specimens having; 125 ml., 250 ml., 500 ml. in volume revealed that the compressive strength of the high volume model is less than that of the low volume. The psychophysical testing indicates the human model may be used as a tool to increase the ability to detect small lumps in a breast.

C.L. Chang *et. al.* (1998) studied the rate of aminolysis of polydimethylsiloxane networks under ambient temperature. The silicone fluid was cured for 8 hours with the aid of a curing agent, which is a mixture of tetraethoxysilane and organometallic tin catalyst. The curing rates were drastically enchanced by adding ethanol to the KOH/Diethylamine (DEA) solution. A mechanism is proposed to elucidate the need of the base as the catalyst. When excess ethanol was added, the dissolution time of the silicone networks was increased as a result of the competition of paring the second base and the nucleophile.

Sang Eun Shim *et. al.* (2002) studied the formulation of bubbles during ultrasonic treatment of cured poly(dimethylsiloxane). The result implies that ultrasonic intensity has significant effect on bubble dynamics. The average size of bubbles at a higher pressure is higher than that at low pressure. This can be explained as at higher pressure bubbles grow more easily by coalescence. Higher applied pressure causes a greater decrease of crosslink density and gel fraction.

U.S. Pat. No. 3,811,133 issued to Eugene Harris entitled "Weighted Prosthetic Breast" discloses a molded breast filled with resilient wadding and which is weighted from the rear of the prosthesis. Although began from the molding process, along with some clay sculpture, the molded is cut open to stuff in the wadding.

U.S. Pat. No.3,812,081 disclosed a molding compound based on a phenylmethyl silicone resin, containing silicon-bonded hydroxyl groups, cured by heating quaternary ammonium salts of strong acids. This patent compares the activity at room temperature and at 110°C of the catalyst with quaternary ammonium butoxides and quaternary ammonium. The gel-time of the resin in each case was determined. The gel time of benzyltriethyl ammonium butoxide at room temperature is 95 min whereas it can active < 1 min even at 110°C. The results indicated that the benzyltriethyl ammonium chloride is much less active at room temperature than the butoxide or the acylate in that the resin is sufficiently inactive even at 110°C, to enable compounding of the resin with filler and other ingredients at a temperature of 100°C, without gelling the resin.

U.S. Pat. No.4,086,666 entitled "Breast Prosthesis," disclosed a process for making an artificial breast appliance. The steps include the making of a negative body cast, grooving the cast to provide air circulation, making a positive cast from the negative cast with fiberglass, modeling the missing breast on the positive cast, followed by forming a silicone rubber mold over the sculpted missing breast and adjacent areas, and forming a support casting over the silicone rubber mold. Silicone rubber is applied in thin layers to the positive cast to form a back wall, colored silicone rubber is painted onto the mold supported by the support casting to simulate the coloring of the breast.

U.S. Pat No. 4,134,218 disclosed a model of a human female breast having simulating skin, glandular, connective and/or skeletal tissue, adipose tissue and tumors. In addition, this patent also discloses methods of using a sophisticated model containing electric conductors to train a person to detect breast tumors by palpation which automatically generates a set of signals representative of the pattern of pressure applied to the model by the person. However, this more sophisticated model and method is used with electronic apparatus and needs interpretation of the signals generated and requires the use of a microprocessor, adding to the complexity and cost of the model.

U.S. Pat No. 4,867,686 described a model of a human female breast having simulated tumors for teaching breast examination. The model is substantially hemispherical in shape and generally comprises of an elastomeric membrane simulating skin, a transparent backing member connected to the opaque membrane to define a chamber therebetween, means simulating adipose tissue and a tumor within the chamber. The skin comprises of polyvinyl chloride, polyurethane or elastomeric silicone polymers. Suitable elastomeric silicone polymers are commercially available from General Electric Company and Dow Corning Corporation. Satisfactory results for a realistic skin may be obtained by mixing the gel and the curing agent in a ratio of about 10:1 by weight, respectively. The material used to form simulating adipose tissue comprises General Electric's RTV 1619 silicone gel compound and Dow Corning's silicone dielectric gel compound No.3-6527. The model contained five simulated tumors having dimensions of about 3,5,5,7 and 10 mm., respectively, in various locations.

U.S. Pat No. 5,824,075 presented a method of making artificial breast appliance. A molded silicone form is used to prepare a breast appliance front mold and a breast appliance back mold. Skin type nipple and breast skin silicone is first introduced into the mold before closure. The nipple formed typically requires about 2.5 grams of material. The weight of silicone material is dependent upon the size of the breast appliance since a lager breast appliance will require more surface area. In addition, a larger breast appliance will require a thicker skin to adequately support the mass of silicone gel inside it. For a breast appliance corresponding to a bra cup in the range of "size A" to "size B" about 40 grams, "size B" to "size C" about 60 grams and "size C" to "size D" about 80 grams of the silicone material required. Once mixed, the pot life is ranging from 10 to 20 minutes depending upon temperature used. The total cure time ranges from 4 to 6 hours at room temperature.