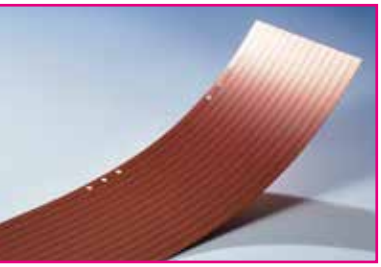
Hole etching in printed circuit board foils

Plasma foil etching in microstructure technology

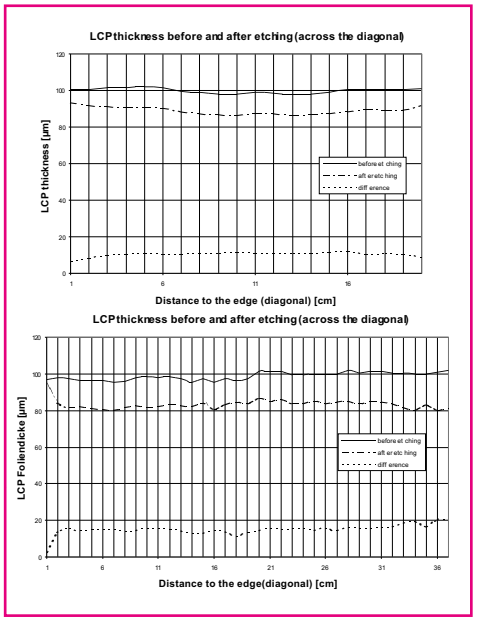


Application

Polymer foils are an important substrate for many industrial products. They are even used as basis for flexible printed circuit boards. First the foil gets embossed and then it is metallized.

As embossing will not provide all kinds of structures (e.g. feed-through contacts) plasma etching is used to remove process-related remainders of the polymer foil before metallization. Also the purposeful foil areas will be etched at the same rate, so the process has to be stopped once the desired structures have been etched sufficiently.

Due to its activating properties, plasma also enhances the foil's ability to adhere to the metallization.



Plasma process

The graphs show the homogeneity achieved etching two LCP (liquid crystal polymer) foils. The upper one represents the etching results across a 100 µm (0.004") thick LCP foil sample of 150 mm x 150 mm in size (6" x 6"). It has been etched in an O_2/CF_4 plasma for 10 minutes at a rate of 1.1 µm/min. In the most relevant central area of the foil (between 6 and 15 cm from the edge) the standard deviation of the thickness was 0.29 µm (0.15 µm on either side).

The lower graph shows the same for a roughly letter shaped sheet of LCP foil. Etching time was 15 min at a rate of 1.0 µm/min. The standard deviation found was 1.21 µm, 0.6 µm on either side.

Systems engineering

PINK offers customized plasma systems for etching foils up to a size of 297 x 210 mm (12" x 8.4"). The foil is etched on both sides simultaneously. Microwave plasma supports this effect and does not require any electrodes inside the vacuum chamber.

Special features of these plasma systems are the outstanding homogeneity and the high etching rate over the whole surface. This is based on a special modular linear plasma source and on the in-process movement of the foil in the chamber. Applying spring frames, which have been specially adapted for this process, handling of the foil and loading / unloading are easy. Foils hang unstressed inside the chamber during the etching process and do not suffer any thermal damage.

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12.2016