

lamp employing an USAF Test Pattern and a quartz-water filter. The photocured polymer was then developed with toluene for 1 minute at 25° C. The air dried substrate was hard baked employing a cure cycle under vacuum of 25° C. to 220° C. ramp in 1 hour, held at 220° C. for 2.5 hours and then cooled to room temperature. The samples were then metallized via ion-beam sputtering to yield a metal film of thickness 5000 to 10000 Å.

The adhesion was evaluated via a calibrated "Scotch-Tape" adhesion test before and after thermal shock cycling. A thermal shock cycle encompasses the following thermal cycling of the sample: hold at -55° C. for 10 minutes, -55° C. to 125° C. over a rapid ramp, hold at 125° C. for 10 minutes. In the following tables the ratio given means that of 25 squares of the metal, some to all of them were not removed by the tape. That is, 25/25 means that all of the squares remained adhered to the dielectric polymer while 5/25 means that 20 squares of metal were removed.

TABLE J

Metal Layer	Adhesion Measurements Results					
	Before Thermal Shock Cycling		After 92 Cycles		After 184 Cycles	
	2.5 lb. (b)	10.0 lb.	2.5 lb.	10.0 lb.	2.5 lb.	10.0 lb.
Chromium	25/25 Passed	25/25 Passed	25/25 Passed	25/25 Passed	25/25 Passed	25/25 Passed
Chromium	25/25 Passed	25/25 Passed	25/25 Passed	25/25 Passed	25/25 Passed	25/25 Passed
Copper	0/25 Passed	—	—	—	—	—
Copper	5/25 Passed	4/5 Passed	0/4 Passed	—	—	—
Aluminum	25/25 Passed	25/25 Passed	24/25 Passed	24/24 Passed	a	a
Aluminum	0/25 Passed	—	—	—	—	—
Gold	7/25 Passed	7/7 Passed	a	a	a	a
Gold	0/25 Passed	—	—	—	—	—
Nickel	0/25 Passed	—	—	—	—	—
Nickel	0/25 Passed	—	—	—	—	—

a Sample not evaluated.

(b) Tape rating in lb. for 1/4 inch wide tape.

## EXAMPLE 15

STBPAF6-F resin of Example 5 was dissolved in toluene to yield a solution of composition 58.95% STBPAF6-F and 41.1% toluene. This solution was spin coated onto an alumina or silicon substrate (surface) utilizing spin coating rate of 1000 rpm for 60 seconds; soft baked for 1 hour at 60° C. under nitrogen. The polymer was hard baked employing a cure cycle under nitrogen of 25° C. to 220° C. ramp in 3 hours, held at 220° C. for 2.0 hours and then ramped from 220° C. to 25° C. in 4 hours.

The adhesion was evaluated via a calibrated "Scotch-Tape" adhesion test before and after thermal shock cycling. A thermal shock cycle encompasses the following thermal cycling of the sample: hold at -55° C. for 10 minutes, -55° C. to 125° C. over a rapid ramp, hold at 125° C. for 10 minutes.

TABLE K

Substrate	Adhesion Measurements Results			
	Before Thermal Shock Cycling		After 92 Cycles	
	2.5 lb	10.0 lb	2.5 lb	10.0 lb
Alumina	0/25 Passed	—	—	—
Silicon	0/25 Passed	—	—	—

## EXAMPLE 16

STBPA6-F resin of Example 5 was dissolved in toluene to yield a solution of composition 58.9% STBPAF6-F and 41.1% toluene. This solution was spin coated onto an alumina substrate (surface) onto which had been ion-sputtered with a metal film of thickness 5000 Å, utilizing spin coating rate of 1000 rpm for 60 seconds; soft baked for 1 hour at 60° C. under nitrogen. The polymer was hard baked employing a cure cycle under nitrogen of 25° C. to 220° C. ramp in 3 hours, held at 220° C. for 2.0 hours and then ramped from 220° C. to 25° C. in 4 hours.

The adhesion was evaluated via a calibrated "Scotch-Tape" adhesion test before and after thermal shock cycling. A thermal shock cycle encompasses the following thermal cycling of the sample: hold at -55° C. for 10 minutes, -55° C. to 125° C. over a rapid ramp, hold at 125° C. for 10 minutes.

TABLE L

Metal Layer	Adhesion Measurements Results			
	Before Thermal Shock Cycling		After 92 Cycles	
	2.5 lb	10.0 lb	2.5 lb	10.0 lb
Chromium	25/25 Passed	25/25 Passed	a	a
Nickel	0/25 Passed(b)	—	—	—
Copper	0/25 Passed(b)	—	—	—
Aluminum	3/25 Passed	0/3 Passed	—	—
Gold	0/25 Passed(b)	—	—	—

a Sample not evaluated.

(b) Failed at polymer to metal interface.

As can be seen in the above Examples 14-16 chromium adhered particularly well to the dielectric polymers and thus can serve as a suitable base for copper layers which provide conductive patterns in the multilevel structures.

We claim:

1. A method of forming a polymer on a substrate in a predetermined pattern comprising:

(a) coating a substrate with a prepolymer which is an ether of the oligomeric condensation product of a dihydric phenol and formaldehyde having the formula