

LED DIODE ARRAY

The invention relates to a diode array. Shown in Figures 1 and 2 is the novel array. A frame composed of a dielectric polymer substrate 10 is coated with conductive film 12 and 14 on both sides, such as copper. The copper films 12 and 14 are photo-imaged using conventional photo-resist techniques to remove the copper film on the top side within a preselected perimeter to expose the substrate 10, and on the bottom side within the preselected perimeter while defining circuit connections 18 including contacts A and C and tabs 16 projecting into the preselected perimeter and bars 17 extending across the void where the diodes are received. The volume of the substrate is ablated by a laser to remove it entirely within the preselected perimeter to create the void. This occurs without harm to the tabs 16 and bars 17. The tabs and bars are positioned to receive the contacts of diodes 20 and are bonded thereto, preferably by ultrasonic bonding. A 3X3 array is shown. A conformal white epoxy ink 22 is coated on the bottom to protect the connections and to reflect the light from the diodes, which are LEDs, producing white or colored light. The diodes are loaded into the void from the top and are received on the tabs 16 and bars 17 in registry with the contacts on the diodes. After the diodes are placed and bonded, a refractive or diffusive film 30 composed of a suitable photo-imagable polymer, for example Vacleltm, a duPont material, is coated over the diodes as a conformal coating to act as a lens and to spread out the diode light over the perimeter of the substrate. Film 30 can contain additives such as silver particles to enhance the lateral spread or distribution of the light or phosphors in small particulate form to change the light produced by the LEDs regarding its hue, color or intensity.

