

12-17-1996

Method for Producing Conductive or Insulating Feedthroughs in a Substrate

Janet K. Lumpp

Susan D. Allen

University of Iowa, allens17@erau.edu

Follow this and additional works at: <https://commons.erau.edu/db-mechanical-engineering>



Part of the [Mechanical Engineering Commons](#)

Scholarly Commons Citation

Lumpp, J. K., & Allen, S. D. (1996). Method for Producing Conductive or Insulating Feedthroughs in a Substrate. , (). Retrieved from <https://commons.erau.edu/db-mechanical-engineering/9>

This Patent is brought to you for free and open access by the College of Engineering at Scholarly Commons. It has been accepted for inclusion in Mechanical Engineering - Daytona Beach by an authorized administrator of Scholarly Commons. For more information, please contact commons@erau.edu.



US005584956A

United States Patent [19]

[11] Patent Number: **5,584,956**

Lumpp et al.

[45] Date of Patent: **Dec. 17, 1996**

[54] METHOD FOR PRODUCING CONDUCTIVE OR INSULATING FEEDTHROUGHS IN A SUBSTRATE

[75] Inventors: **Janet K. Lumpp**, Coralville, Iowa;
Susan D. Allen, New Orleans, La.

[73] Assignee: **University of Iowa Research Foundation**, Iowa City, Iowa

[21] Appl. No.: **240,206**

[22] Filed: **May 9, 1994**

Related U.S. Application Data

[63] Continuation of Ser. No. 987,783, Dec. 9, 1992, abandoned.

[51] Int. Cl.⁶ **B32B 31/28**; H01K 3/10;
B05D 5/12

[52] U.S. Cl. **156/272.8**; 156/247; 156/253;
29/846; 29/850; 29/852; 427/97; 427/124

[58] Field of Search 156/631, 644,
156/151, 247, 253, 272.8, 273.9, 275.7,
382; 29/846, 850, 852; 427/97, 99, 124;
219/121.7, 121.71, 121.22

[56] References Cited

U.S. PATENT DOCUMENTS

3,562,009	2/1971	Cranston et al.	219/121.71	X
3,691,632	9/1972	Smith	156/632	X
3,873,756	3/1975	Gall et al.	427/97	X
3,984,598	10/1976	Sarazin et al.	156/272.2	X

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

0176931	10/1983	Japan	437/173
2-66954	3/1990	Japan	156/272.8
4-28490	1/1992	Japan	219/121.7
5-200574	8/1993	Japan	219/121.7
9001374	2/1990	WIPO	156/644

OTHER PUBLICATIONS

"Laser drilled holes in fired ceramics," F. F. Fugardi et al. IBM Technical Disclosure Bulletin, vol. 14, Mar. 1972.

"Machining of Advanced Ceramics", Laurel M. Sheppard, pp. 40-43; 46-48; *Advanced Materials and Processes Inc. Metal Progress*, Dec. 1987.

"A Study of Pulsed Laser Planarization of Aluminum for VLSI Metallization", pp. 329-335; R. Liu, et al., Jun. 12-13m 1989 VMIC Conference.

"Feature size and temperature sensitive process windows for excimer laser planarization of aluminum", R. Baseman pp. 84-90; *J.Vac.Sci. Technol.B8* (1), Jan./Feb. 1990.

(List continued on next page.)

Primary Examiner—David A. Simmons

Assistant Examiner—M. Curtis Mayes

Attorney, Agent, or Firm—Fleshner & McConathy PLLC

[57] ABSTRACT

A method for producing feedthroughs in a substrate having a front and back surface, wherein the substrate either has a hole or absorbs radiation at a given wavelength. The method includes selecting and intimately bonding a sheet to the back surface of the substrate with an adhesive which is absorptive at the given wavelength. If the substrate has a hole, an exposed area of the sheet is illuminated with laser radiation at the given wavelength and at a power level sufficient to ablate a portion of the sheet behind the exposed area, thereby creating the feedthrough in the substrate. If the substrate has no hole, an area on the front surface of the substrate is illuminated with laser radiation at the given wavelength and at a power level sufficient to ablate a portion of the substrate and a portion of the sheet behind the area, thereby creating the feedthrough in the substrate. The sheet can then be removed from the substrate. Alternatively, if the sheet is conductive, the sheet can remain bonded to the substrate and can serve as a ground plane for the substrate. If the sheet is an insulator, the feedthrough is an insulated feedthrough and if the sheet is conductive, the feedthrough is a conductive feedthrough. This procedure can be extended to produce a two conductor feedthrough.

12 Claims, 10 Drawing Sheets

