US 20220369468A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2022/0369468 A1**

LIN et al. (43) **Pub. Date: Nov. 17, 2022**

(54) **SUBSTRATE STRUCTURES AND METHODS OF MANUFACTURE**

(71) Applicant: **SEMICONDUCTOR COMPONENTS INDUSTRIES, LLC**, Phoenix, AZ (US)

(72) Inventors: **Yusheng LIN**, Phoenix, AZ (US); **Sadamichi TAKAKUSAKI**, Ota-City (JP)

(73) Assignee: **SEMICONDUCTOR COMPONENTS INDUSTRIES, LLC**, Phoenix, AZ (US)

(21) Appl. No.: **17/816,144**

(22) Filed: **Jul. 29, 2022**

Related U.S. Application Data

(62) Division of application No. 15/868,747, filed on Jan. 11, 2018, now Pat. No. 11,419,217, which is a division of application No. 15/206,574, filed on Jul. 11, 2016, now Pat. No. 9,883,595, which is a division of application No. 14/534,482, filed on Nov. 6, 2014, now Pat. No. 9,408,301.

Publication Classification

(51) **Int. Cl.**

H05K 3/06	(2006.01)
H05K 1/03	(2006.01)
H01L 23/14	(2006.01)
H01L 21/48	(2006.01)
H05K 1/09	(2006.01)
H05K 3/46	(2006.01)
H05K 3/00	(2006.01)
H01L 23/15	(2006.01)
H05K 1/05	(2006.01)
C04B 37/02	(2006.01)
H01L 23/373	(2006.01)

(52) **U.S. Cl.**

CPC ***H05K 3/06*** (2013.01); ***H05K 1/0313*** (2013.01); ***H01L 23/142*** (2013.01); ***H01L 21/4857*** (2013.01); ***H05K 1/09*** (2013.01); ***H05K 3/4644*** (2013.01); ***H05K 3/064*** (2013.01); ***H05K 3/0011*** (2013.01); ***H05K 1/0306*** (2013.01); ***H01L 23/15*** (2013.01); ***H05K 1/056*** (2013.01); ***C04B 37/021*** (2013.01); ***H01L 23/3735*** (2013.01); ***H01L 21/4807*** (2013.01); ***H01L 21/4871*** (2013.01); ***H05K 1/036*** (2013.01); *C04B 2237/34* (2013.01); *C04B 2237/343* (2013.01); *C04B 2237/402* (2013.01); *C04B 2237/406* (2013.01); *C04B 2237/407* (2013.01); *C04B 2237/52* (2013.01); *C04B 2237/64* (2013.01); *C04B 2237/82* (2013.01); *H01L 2924/0002* (2013.01); *H05K 2201/09736* (2013.01); *H01L 23/49822* (2013.01)

(57) **ABSTRACT**

A power electronic substrate includes a metallic baseplate having a first and second surface opposing each other. An electrically insulative layer also has first and second surfaces opposing each other, its first surface coupled to the second surface of the metallic baseplate. A plurality of metallic traces each include first and second surfaces opposing each other, their first surfaces coupled to the second surface of the electrically insulative layer. At least one of the metallic traces has a thickness measured along a direction perpendicular to the second surface of the metallic baseplate that is greater than a thickness of another one of the metallic traces also measured along a direction perpendicular to the second surface of the metallic baseplate. In implementations the electrically insulative layer is an epoxy or a ceramic material. In implementations the metallic traces are copper and are plated with a nickel layer at their second surfaces.