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**LIAO et al.**(10) **Pub. No.: US 2023/0230881 A1**(43) **Pub. Date: Jul. 20, 2023**(54) **STRUCTURE AND FORMATION METHOD  
OF SEMICONDUCTOR DEVICE WITH  
CARBON-CONTAINING CONDUCTIVE  
STRUCTURE****Publication Classification**(51) **Int. Cl.****H01L 21/768** (2006.01)**H01L 23/522** (2006.01)**H01L 23/532** (2006.01)(52) **U.S. Cl.**CPC .... **H01L 21/76876** (2013.01); **H01L 23/5226**  
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**ABSTRACT**

A semiconductor device structure and a method for forming a semiconductor device structure are provided. The semiconductor device structure includes a substrate and a conductive line over the substrate. The semiconductor device structure also includes a catalyst structure over the conductive line and a carbon-containing conductive via directly on the catalyst structure. The semiconductor device structure further includes a dielectric layer surrounding the carbon-containing conductive via.

