US 20230231019A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2023/0231019 A1**

Lee (43) **Pub. Date: Jul. 20, 2023**

(54) **GAN/DIAMOND WAFERS**

(71) Applicant: **RFHIC Corporation**, Anyang-si (KR)

(72) Inventor: **Won Sang Lee**, Chapel Hill, NC (US)

(21) Appl. No.: **18/176,427**

(22) Filed: **Feb. 28, 2023**

Related U.S. Application Data

(62) Division of application No. 16/897,329, filed on Jun. 10, 2020, now Pat. No. 11,652,146.

(60) Provisional application No. 62/971,869, filed on Feb. 7, 2020.

Publication Classification

(51) **Int. Cl.**

H01L 29/20	(2006.01)
H01L 21/02	(2006.01)
H01L 21/768	(2006.01)
H01L 29/205	(2006.01)
H01L 29/267	(2006.01)
H01L 29/66	(2006.01)
H01L 29/16	(2006.01)
H01L 23/00	(2006.01)

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

CPC ***H01L 29/2003*** (2013.01); ***H01L 21/02488*** (2013.01); ***H01L 21/02527*** (2013.01); ***H01L 21/0254*** (2013.01); ***H01L 21/76871*** (2013.01); ***H01L 29/205*** (2013.01); ***H01L 29/267*** (2013.01); ***H01L 29/66462*** (2013.01); ***H01L 21/76897*** (2013.01); ***H01L 29/1602*** (2013.01); ***H01L 21/02378*** (2013.01); ***H01L 24/94*** (2013.01)

(57) **ABSTRACT**

Wafers including a diamond layer and a semiconductor layer having III-Nitride compounds and methods for fabricating the wafers are provided. A nucleation layer, at least one semiconductor layer having III-Nitride compound and a protection layer are formed on a silicon substrate. Then, a silicon carrier wafer is glass bonded to the protection layer. Subsequently the silicon substrate, nucleation layer and a portion of the semiconductor layer are removed. Then, an intermediate layer, a seed layer and a first diamond layer are sequentially deposited on the III-Nitride layer. Next, the silicon carrier wafer and the protection layer are removed. Then, a silicon substrate wafer that includes a protection layer, silicon substrate and a diamond layer is prepared and glass bonded to the first diamond layer.