US 20240244853A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0244853 A1**

BI et al. (43) **Pub. Date: Jul. 18, 2024**

(54) **PEROVSKITE/SILICON HETEROJUNCTION TANDEM SOLAR CELL AND PREPARATION METHOD THEREOF**

(71) Applicant: **Advanced Solar Technology Institute, Xuancheng**, Anhui (CN)

(72) Inventors: **Enbing BI**, Anhui (CN); **TED TIE GUO**, Anhui (CN); **Qiankai BA**, Anhui (CN)

(73) Assignee: **Advanced Solar Technology Institute, Xuancheng**, Anhui (CN)

(21) Appl. No.: **18/556,676**

(22) PCT Filed: **Mar. 15, 2023**

(86) PCT No.: **PCT/CN2023/081524**

§ 371 (c)(1),
(2) Date: **Oct. 23, 2023**

(30) **Foreign Application Priority Data**

Mar. 29, 2022 (CN) 202210319630.X

Publication Classification

(51) **Int. Cl.**

H10K 30/57	(2006.01)
H10K 30/10	(2006.01)
H10K 30/40	(2006.01)
H10K 30/85	(2006.01)
H10K 71/15	(2006.01)
H10K 85/50	(2006.01)

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

CPC ***H10K 30/57*** (2023.02); ***H10K 30/10*** (2023.02); ***H10K 30/40*** (2023.02); ***H10K 30/85*** (2023.02); ***H10K 71/15*** (2023.02); ***H10K 85/50*** (2023.02)

(57) **ABSTRACT**

The present invention relates to the technical field of solar cells, and particularly relates to a perovskite/silicon heterojunction tandem solar cell and a preparation method thereof. The solar cell includes a silicon-based sub-cell and a perovskite sub-cell laminated on the silicon-based sub-cell, where intermediate layers or recombination junctions formed by a p-type heavily-doped amorphous silicon layer and an n-type heavily-doped amorphous silicon layer are arranged between the silicon-based sub-cell and the perovskite sub-cell. According to the present invention, through the use of the p-type heavily-doped amorphous silicon layer and the n-type heavily-doped amorphous silicon layer as a carrier recombination junction, on the one hand, the preparation and equipment costs are greatly reduced, and on the other hand, the photocurrent density and conversion efficiency of the tandem cell can be improved.