



US 20240213089A1

(19) **United States**

(12) **Patent Application Publication**
SUBBAIYAN et al.

(10) **Pub. No.: US 2024/0213089 A1**

(43) **Pub. Date: Jun. 27, 2024**

(54) **INTEGRATED ATMOSPHERIC PLASMA
TREATMENT STATION IN PROCESSING
TOOL**

(71) Applicant: **Lam Research Corporation**, Fremont,
CA (US)

(72) Inventors: **Navaneetha Krishnan SUBBAIYAN**,
Portland, OR (US); **Patrick LITTLE**,
WEST LINN, OR (US); **Daniel Mark
DINNEEN**, Knocksentry, Castleconnell
(IE); **Shantinath GHONGADI**, Tigard,
OR (US)

(21) Appl. No.: **18/556,978**

(22) PCT Filed: **Apr. 20, 2022**

(86) PCT No.: **PCT/US2022/025615**

§ 371 (c)(1),

(2) Date: **Oct. 24, 2023**

Related U.S. Application Data

(60) Provisional application No. 63/201,392, filed on Apr.
27, 2021.

Publication Classification

(51) **Int. Cl.**

H01L 21/768 (2006.01)

H01J 37/32 (2006.01)

H01L 21/02 (2006.01)

H01L 21/67 (2006.01)

H01L 21/677 (2006.01)

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

CPC .. **H01L 21/76862** (2013.01); **H01J 37/32376**

(2013.01); **H01J 37/3244** (2013.01); **H01J**

37/32825 (2013.01); **H01L 21/67167**

(2013.01); **H01L 21/6723** (2013.01); **H01L**

21/67745 (2013.01); **H01L 21/76873**

(2013.01); **H01L 21/02068** (2013.01)

(57)

ABSTRACT

An atmospheric plasma treatment station is integrated in a semiconductor process tool. The atmospheric plasma treatment station directly interfaces with a deposition chamber of the semiconductor process tool without adding to the footprint or form factor of the semiconductor process tool. The atmospheric plasma treatment station includes a movable atmospheric plasma source such as a linear head for scanning across a surface of a substrate. The atmospheric plasma treatment station provides an enclosed space in a controlled environment with non-reactive gas flowing through the enclosed space. Process gases may be supplied to the linear head based on a surface condition of the substrate being treated.

