

# JOURNAL OF PLASMA AND FUSION RESEARCH

*The Journal of the Japan Society of Plasma Science and Nuclear Fusion Research*

Vol. 96, No. 3, March 2020

## Commentary

- Characteristics of Nanoseconds Pulsed Discharge Plasma Having Intense Reduced Electric Field and Its Control Techniques ..... NAMIHIRA Takao, RYU Terumasa and WANG Douyan 97

## Special Topic Articles

- Unsung Technologies in Plasma Processing which Supports Manufacturing Quality of Semiconductor Devices
1. Introduction ..... UESUGI Fumihiko 103
  2. Instantaneous Generation of Many Flaked Particles in Mass-Production Plasma Etching Equipment ..... KASASHIMA Yuji and UESUGI Fumihiko 106
  3. Development of Detection Method for Micro-Arc Discharge in Plasma Process by using Acoustic Emission Sensor ..... KASASHIMA Yuji, TABARU Tatsuo and UESUGI Fumihiko 111
  4. Micro-Arc Discharge Detection Method in Plasma Process by Monitoring Load Impedance ..... KUNIIIE Shinji, SATO Shusaku, KIMURA Naoya, WAKAMOTO Satoru, KASASHIMA Yuji, MOTOMURA Taisei, TABARU Tatsuo and UESUGI Fumihiko 117
  5. Development of High Corrosion Resistance Ceramics for Chamber Parts in Mass-Production Plasma Etching Equipment ..... KASASHIMA Yuji and UESUGI Fumihiko 122
  6. Conclusion ..... UESUGI Fumihiko 126

## Project Review

- Japan-US Joint Research Project PHENIX-Accomplishments of 6 Years Project and the Next Program-
1. Overview of PHENIX Project ..... UEDA Yoshio, HATANNO Yuji, YOKOMINE Takehiko, HINOKI Tatsuya, HASEGAWA Akira, OYA Yasuhisa and MUROGA Takeo 129
  2. Task 1: Investigation of Overall Heat Flow Response in Plasma-Facing Component ..... YOKOMINE Takehiko, UEDA Yoshio, TOKUNAGA Kazutoshi, YUKI Kazuhisa, AKIYOSHI Masafumi and IBANO Kenzo 131
  3. Task 2: Thermal and Mechanical Properties of Neutron Irradiated Tungsten ..... HINOKI Tatsuya, HASEGAWA Akira, MIYAZAWA Takeshi, AKIYOSHI Masafumi and KONDO Sosuke 136
  4. Task 3: Tritium Behavior and Its Neutron Irradiation Effect ..... OYA Yasuhisa, HATANNO Yuji, NOBUTA Yuji, YAMAUCHI Yuji, KOBAYASHI Makoto, OHYA Makoto, KATAYAMA Kazunari, OTSUKA Teppei and UEDA Yoshio 140
  5. FRONTIER Project (2019-2024) ..... HATANNO Yuji, YOKOMINE Takehiko, HINOKI Tatsuya, HASHIMOTO Naoyuki, OYA Yasuhisa, OTSUKA Teppei, KONDO Masatoshi, MIYAZAWA Junichi and NAGASAKA Takuya 145

## R&D Activities

- Collaboration Works of JSPS Bilateral Joint Research Projects (Japan (NIFS) - China (ASIPP)) ..... NOJIRI Kunpei and ASHIKAWA Naoko 149

Mourning ..... 152

Information ..... 154

Announcement ..... 160

## Cover

TEM images of cross-section of He-W co-deposition layer formed at (a) 473 K and (b) 573 K. (c) TEM images and EDS analysis of 573 K. With increasing the sample temperature from 473 K to 573 K, the size of the He bubbles increased from several nm to several tens of nm, and blisters were generated at 573 K, as shown in (c). The density of W in the co-deposition layer formed at 573 K is about 62% of that of the W layer below. The results indicate that the co-deposition layer is very porous and comprised of fine He bubble and cavities. (Kosuke ASAI *et al.*, Plasma and Fusion Research, Vol. 15, 1201004 (2020) <http://www.jspf.or.jp/>)