

SEONG BONG KIM

INVITED TALK 4

Rotary Magnetron Sputtering with an ECR plasma

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Abstract

The cathode potential drop in conventional magnetron sputtering induces high-energy particles, such as Ar atoms and O-ions, which are damaging to the thin film. Reducing the bias voltage at the cathode can decrease the cathode potential drop and the generation of high-energy particles. However, this reduction in bias voltage may also decrease plasma density or cause the plasma to turn off if the voltage falls below a certain threshold. This is because the power supply in conventional magnetron sputtering is used to generate and sustain plasmas, as well as to accelerate incident ions onto the cathode. If plasma generation is independent of ion acceleration for sputtering, then it is possible to reduce the bias voltage at the cathode without affecting the plasma, thus minimizing damage to the thin film.

In this talk, I would introduce a rotary magnetron sputtering system with an ECR plasma, which achieves high-density plasma near the cathode at low operating pressure (less than 1 mTorr) using a microwave at a frequency of 2.45 GHz. This sputtering system is able to control the bias voltage at the cathode as needed, improving the quality of thin films.

Keywords: ECR Plasma, Rotary magnetron sputtering

CURRICULUM VITAE



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Education History

[Doctorate]	2002-2011	Physics, POSTECH
[Bachelor]	1996-2002	Mechanical Engineering, POSTECH



Professional Background

2022 - Present	Principal Researcher, IPT, KFE Professor, UST
2020 - 2021	Head of Division of Plasma-Bio Convergence, KFE
2014 - 2020	Head of Division of Innovation Plasma Research, KFE
2013 - 2014	Team leader of Plasma Source Research Team, KFE



Selected Awards and Honors

1.	2024	Excellent Achievement Researcher Award in Interdisciplinary Research Field from Government-Funded Science and Technology Research Institutes by MSIT (Ministry of Science and ICT)
2.	2023	Technology Transfer Award by KFE
3.	2019	FOODPOLIS Promotion Award by MAFRA (Ministry of Agriculture, Food and Rural Affairs)
4.	2018	Science and Technology Promotion Award by MSIT (Ministry of Science and ICT)
5.	2017	Excellent Researcher Award in Innovative Technology by NST (National Research Council of Science and Technology)



Selected Publications

1.	Se Hoon Ki, Sang Hye Ji, Seong Bong Kim and Seungil Park “Characteristics of Low-Temperature Plasma for Activation of Plastic-degrading Microorganisms” Scientific Reports 14, 19749 (2024)
2.	Junghyun Lim, Eun Jeong Hong, Seong Bong Kim , Mi-Ai Lee and Seungmin Ryu “Bactericidal Effect of Underwater Plasma Treatment on Waste Brine from Kimchi Production Process and the Evaluation of Reusability of Plasma-Treated Waste Brine in Salting Kimchi Cabbage” Foods 12, 728 (2023)
3.	Junghyun Lim, Eun Jeong Hong, Seong Bong Kim and Seungmin Ryu “The Effect of Gap Distance between a Pin and Water Surface on the Inactivation of <i>E-coli</i> Using a Pin-toWater Plasma” International Journal of Molecular Sciences 23, 5423 (2022)
4.	Seungil Park, Gyeong Han Jeong, Sung Hoon Jee, Tae Hoon Kim and , Seong Bong Kim “Mechanism of (-1) EGCG Dimerization by Low-Temperature Plasma” Scientific Reports 12, 15396 (2022)
5.	Gyeong Han Jeong, Seungil Park, Seong Bong Kim , Cheorun Jo, Tae Hoon Kim “Molecular hybridization based on -epigallocatechingallate as a new class of antiglycation agents” Bioscience, Biotechnology, and Biochemistry 85, 1069 (2021)