Department of
Mechanical Engineering
The University of Hong Kong

DEPARTMENT OF
MECHANICAL ENGINEERING
THE UNIVERSITY OF HONG KONG

SEMINAR

Title: Central Fabrication Laboratory- Technical sharing session – Co-Sputtering Practical Application

Date: 10 Sep 2025 (Wednesday)

Time: 9:45 – 10:45 AM

Venue: 7-35, Haking Wong Building, HKU

Speaker: Mr. Charlie HU

Senior Manager, Kurt J. Lesker

Language: Mandarin

Limited seats available on a first-come first-served basis

Abstract:

The Central Fabrication Laboratory (CFL) is a cutting-edge cleanroom facility located at the University of Hong Kong. Its primary mission is to provide advanced fabrication facilities and expertise to enhance teaching and research activities in micro/nano fabrication. As a leading research laboratory, CFL offers open access not only to University of Hong Kong members but also to local and international institutions, researchers, and companies, with collaborations from the private sector always encouraged. The technical sharing sessions offered by CFL are designed to keep participants updated on the latest micro/nano fabrication techniques and provide valuable networking opportunities with experts from around the world.

Many sputter-coatings of interest are compounds. They could be deposited by co-sputtering from multiple sources or by using compound targets. Often the compound target material and the deposited thin film are electrically insulating making DC sputtering and substrate biasing unsuitable, so RF sputtering must be used instead.

When sputtering compounds, it can be difficult to obtain the correct chemical stoichiometry in the deposited thin film even when using a stoichiometric target. The sputter plasma can break up the compound into its constituent elements and volatile species (e.g. nitrogen, oxygen, hydrogen) can be pumped away or otherwise lost to the process. This leads to the deposited thin film being deficient in these elements, i.e. sub-stoichiometric.

To combat this problem a gas containing the deficient elements can be flowed into the chamber along with the inert sputter gas to top-up the lost elements. The gas must be sufficiently chemically reactive that it either reacts with the sputtered flux or deposited film directly, or once it has been activated or ionized by the plasma generated by the sputter source or a bias excitation. This is Reactive Sputtering. The amount, or more precisely the partial pressure, of the reactive gas can be controlled to tune the stoichiometry of the thin film coating to the application. Typical reactive gases include nitrogen, oxygen, hydrogen and hydrocarbons, such as methane. This is a flexible and commonly used technique, although it suffers from some disadvantages. RF sputtering typically produces less than half the deposition rate than DC sputtering. Plus compounds typically have lower sputter yields than metallic targets which further reduces efficiency. RF energy is also more complicated to implement than DC and is more difficult to scale up to higher powers.

As an alternative, the reactive gas (or gases) can be used to supply the entire proportion of certain elements of the thin film, while the other elements are DC sputtered from metallic/conductive targets. This offers increased deposition rates as the targets can be sputtered efficiently at high rate, while the reactive gas contributes to the rate by supplying a significant proportion of the growing thin film. Another advantage is that the stoichiometry can be personalized over a much wider range, or even graded from pure metal. However, as the metallic target surface also reacts with the gas, process control is usually more demanding with this technique.

Biography:

Mr. Charlie HU , Senior Manager of Asia PED Technical Sales / Technical Support / Service for Kurt J. Lesker.

Mr. Charlie HU has worked at Kurt J. Lesker for more than 16 years and has been in the thin film deposition system product sector for over 10 years. He is the product expert in Electron Beam evaporation, Thermal evaporation, Magnetron sputtering, ALD , specializing in both hardware and process tuning.

Charlie Hu

Senior Manager of Asia PED Technical Sales / Technical Support / Service

Shanghai