



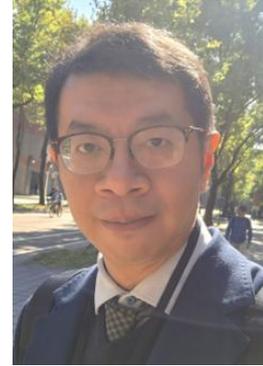
SEMINAR

Metallurgy Renaissance: Unlocking Sustainability through Novel Microstructures

Date: 4 March, 2026 (Wednesday)

Time: 10:30 a.m.

Venue: Room 7-34 & 7-35
Haking Wong Building
HKU



Speaker: Professor Hung-Wei (Homer) Yen
Department of Material Science and Engineering
Advanced Research Center of Green Materials Science and Technology
National Taiwan University
Taiwan

Abstract:

Metallurgy is frequently regarded as incompatible with environmental sustainability because of its carbon-intensive production. This perception is incomplete. Metals and Alloys underpin modern infrastructure, transportation, energy systems, and manufacturing, and any realistic strategy toward net-zero carbon emission by 2050 must therefore account for their continued and essential use.

This presentation explores a metallurgical renaissance aimed at enabling a future society with net-zero carbon emissions. It first introduces a strong, ductile, and lightweight steel achieved through dual nanoscale ordering, an innovative microstructural design that supports the development of green products by reducing material usage and associated carbon emissions. It then presents a novel aging strategy in aluminum alloy—double aging—which enables effective paint-bake hardening while significantly shortening the aging period, thereby improving processing efficiency. The third topic reveals the unique internal microstructure of electrowon iron, demonstrating exceptionally high strength and highlighting new opportunities for sustainable production routes. These advances contribute to both green products, green processes, and green applications that are essential for reducing carbon emissions. In conclusion, metallurgy should not be regarded as an obstacle to sustainability, but rather as a material system capable of continuous reinvention; a rigorous and forward-looking metallurgical approach is indispensable if structural alloys are to contribute effectively and credibly to achieving net-zero carbon emissions by 2050.

Biography:

Hung-Wei (Homer) Yen is a materials scientist and microscopist based in Taiwan. He currently leads the Microstructure & Defects Physics Group at National Taiwan University, where he serves

as Young Chair Professor and Deputy Chair of the Department of Materials Science and Engineering. His research focuses on microstructure–property relationships in advanced structural materials, including advanced high-strength steels, biomedical titanium alloys, and high-entropy alloys. Homer applies state-of-the-art materials characterization techniques to probe the inner space of materials and devices, aiming to uncover fundamental mechanisms governing their property and performance. His recent research focuses on hydrogen-related phenomena in materials and devices, particularly hydrogen storage alloys and hydrogen embrittlement. He established Taiwan’s first local electrode atom probe and has developed the facility with a strong emphasis on semiconductor research. To date, Homer has authored over 140 SCI-indexed journal papers (h-index: 38), holds 10 patents, and has delivered more than 50 invited talks at academic and industrial events worldwide. His research is supported by extensive international collaborations with teams in the United States, United Kingdom, China, Hong Kong, Japan, Korea, Singapore, Australia, Austria, Germany, and Spain.

ALL INTERESTED ARE WELCOME

For further information, please contact Prof. M.X. Huang at 3917 7906.