Hung-Wei (Homer) Yen (homeryen@ntu.edu.tw)

Microstructure & Defect Physics Research Group (http://www.mse.ntu.edu.tw/~homer/index.html)

PhD in Materials Science & Engineering, National Taiwan University

CURRENT POSITIONS

Associate Professor | Department of Materials Science and Engineering, National Taiwan University

Executive Director of International Affairs | College of Engineering, National Taiwan University

Executive Director | International Institute of Applied Materials Engineering, National Taiwan University

Director | Advanced Application Centre for Microscopy & Microanalysis (AACMM), National Taiwan University

RESEARCH AREAS

Physical Metallurgy:

Phase Transformation, Microstructure, Crystal Defects, Dislocation Theory, Mechanical Behaviors

Structural Materials:

Steels, Light Metals, High-Entropy Alloy, Compound Semiconductor

Advanced Characterization:

Transmission Electron Microscopy, Electron Backscattering Diffraction, Atom Probe Tomography, Hydrogen Thermal Desorption

Computational Approach:

Thermodynamic Phase Diagram, Artificial Neural Network, Constitutive Modelling, Computational Microscopy

PROFESSION EXPERIENCE

2011.2 Postdoctoral Assistant, Tjing Ling Industrial Research Institute, National Taiwan University (until 2012.8)

2012.8 Atom Probe Scientist, Australian Centre for Microscopy & Microanalysis, the University of Sydney (until 2014.8)

2014.8 Assistant Professor, Department of Materials Science & Engineering, National Taiwan University (until 2018.7)

2018.8 Deputy Chair, Department of Materials Science & Engineering, National Taiwan University (until 2019.7)

HONORS AND AWARDS

2010 Jeme Tien-Yow Engineering Paper Award, the Chinese Engineering Society, Taiwan

2014 Distinguished Junior Research Fellowship, Ministry of Science and Technology, Taiwan (2014-2917)

2016 Excellent Reviewer for Materials and Metallurgical Transactions A

2017 2016 NTU Excellent Teaching Award (Top 9%)

2017 Project Grant for Excellent Young Scholar, Ministry of Science and Technology, Taiwan (2017-2020)

2018 Future Tech Prize in Future Tech Expo 2018, Ministry of Science and Technology, Taiwan

2018 Excellent Reviewer for Acta/Scripta Materialia, 2018

2019 2018 Excellent Teaching (Top 9%), National Taiwan University
2019 Lecture Award, Asian Forum on Light Metals, Taiwan
2020 2019 Excellent Teaching (Top 9%), National Taiwan University
2020 Project Grant for Excellent Young Scholar, Ministry of Science and Technology, Taiwan (2020-2023)
2020 Excellent Young Scholar Award, Chinese Materials Research Society
2021 2020 Distinguished Teaching Award (Top 1%), National Taiwan University
2021 Ta-You Wu Memorial Award, Ministry of Science and Technology, Taiwan
2021 Academic Career Advancement Award, College of Engineering, National Taiwan University Taiwan

REPRESENTATIVE WORKS

1. Zen-Hao Lai, Yi-Ting Lin, Yi-Hsuan Sun, Jui-Fan Tu, Hung-Wei Yen*, Hydrogen-induced ductilization in a novel austenitic lightweight TWIP steel, *Scripta Materialia*, 213, 114629 (2022)
2. Zen-Hao Lai, Yi-Hsuan Sun, Yi-Ting Lin, Jui-Fan Tu, Hung-Wei Yen*, Mechanism of twinning induced plasticity in austenitic lightweight steel driven by compositional complexity. *Acta Materialia*, 210, 116814 (2021)
3. Guan-Ju. Cheng, Lola Lilensten, Ching-Yuan Huang, Baptiste Gault*, Hung-Wei Yen*, Nanoscale compositional fluctuations enabled by dynamic strain-induced austenite reversion in a Mn-rich duplex steel. *Scripta Materialia*, 181, 101-107 (2020)
4. Chun-Te Wu, Hsiao-Tzu Chang, Chien-Yu Wu, Shi-Wei Chen, Sih-Ying Huang, Mingxin Huang, Yeong-Tsuen Pan, Peta Bradbury, Joshua Chou*, Hung-Wei Yen*, Machine learning recommends affordable new Ti alloy with bone-like modulus, *Materials Today*, 34, 41-50 (2020)
5. Shih-Che Chen, Yuan-Tsung Wang, Yu-Chen Lin, Ching-Yuan Huang, Jer-Ren Yang, Hung-Wei Yen*, Microstructure and mechanical behaviors of GPa-grade TRIP steels enabled by hot-rolling processes. *Materials Science and Engineering: A*, 761(22), 138005 (2019).
6. Guan-Ju. Cheng, Baptiste Gault, Cheng-Yao Huang, Ching-Yuan Huang, Hung-Wei Yen*, Warm ductility enhanced by austenite reversion in ultrafine-grained duplex steel. *Acta Materialia*, Vol. 148, pp. 345-355 (2018).
7. BinBin He, Bin Hu, Hung-Wei Yen, Guan-Ju Cheng, Zuankai Wang, Haiwen Luo*, Mingxin Huang*. High dislocation density–induced large ductility in deformed and partitioned steels. *Science*, eaan0177. (2017).
8. Hung-Wei Yen*, Steve Woei Ooi *, Eizadjou Mehdi, Andrew Breen, Ching-Yuan Huang HKDH Bhadeshia, Simon P. Ringer*, Role of stress-assisted martensite in the design of strong ultrafine-grained duplex steels. *Acta Materialia*, 84(1), 100-114 (2015).
9. Hung-Wei Yen, Mingxin Huang, CP Scott, Jer-Ren Yang*, Interactions between deformation-induced defects and carbides in a vanadium-containing TWIP steel, *Scripta Materialia*, 66(12), 1018-1023 (2012)
10. Hung-Wei Yen, Po-Yu Chen, Ching-Yuan Huang, Jer-Ren Yang*, Interphase precipitation of nanometer-sized carbides in a titanium–molybdenum-bearing low-carbon steel, *Acta Materialia*, 59(16), 6264-6274 (2011)

Biography

Dr. Homer Yen is a metallurgist and a microscopist in Taiwan. He received PhD under supervision of Prof. Jer-Ren Yang at National Taiwan University, developing 780 MPa-grade hot-rolled steel strip with China Steel Corporation. He also works under Prof, Simon Ringer at University of Sydney, eploring inner space of ultrafine-grained duplex steel by using atom probe tomography. Homer joined NTU in 2014 summer and lauched Microstructure and Defect Physics Group, to develop alloys with novel properties by manipulating their microstructure and defects. Homer's major scientific contribution is about principles of physical metallurgy, explored in novel materials by using advanced characterizations. He has published over 100 SCI/EI papers, over 30 invited talks and 8 patents, working on both tracks toward academy and industry. His important contributions include the strongest ductile steel (SCIENCE, 2017), low-modulus biomedical Ti alloy (Material Today, 2019), high-entropy lightweight steel (Acta Materialia, 2022), Mg-based hydrogen stroage alloy (Current Project) and applications of atom probe tomography (Current Project). Besides, Homer, as a volunteer, lauched NTU-OI Microscopy School to deliver microscopy education in Taiwan. His industrial partners include China Steel Corporation, Arcelormittale (FR), Ovako (SE), Oxford Instruments (UK), Fuseng, MIRDC and TSMC. His international experience across Australia, Hong Kong, China, USA, France, Spain, Sweden, Japan, German and Uited Kingdom.

Microscopy Renaissance: Applications of Computational Microscopy in Materials Science

顯微術文藝復興: 材料科學中的演算式顯微術應用

Hung-Wei (Homer) Yen

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Enabling capability for microscopy and microanalysis beyond its intrinsic resolution or accuracy, by *Computational Microscopy*, is able to provide new insights into materials inner space. Computational microscopy is a rising field in materials characterizations incubating new materials science in recent decays. This talk provides introductions to two digital microscopy technologies: electron backscattering diffraction (EBSD) and atom probe tomography (APT). EBSD is an approach of crystallographic mapping of materials surface. It stores pixel-by-pixel crystallographic information, which can be further processed for various purposes. APT is a state-of-art technique providing atom-by-atom three-dimension information of materials. Importantly, the data from APT is completely digital and the information analysis is heavily computational. Moreover, we will experience three interesting journeys into inner space of advanced materials. First, we travel back to see how microstructure in steel forms in a rapid quenching from high temperature. Second, we predict possible fracture in the future based on the current physiognomy. Third, we share many materials novelties in nanostructure and learn how atom-by-atom information playing critical role in materials properties. These critical characterizations is able to inspire new thinking and further drive new materials design. We believe that there's plenty of room at the bottom with computation microscopy.