Program and Abstracts

Korean Scientists and Engineers Association in Austria (KOSEAA)
2025 Spring Workshop

TU Wien, Vienna, Austria
10 May 2025

Program

Program 1
TU Wien, Wiedner Hauptstraße 8, 1040 Wien
FH Hörsaal 2, 2nd Floor Yellow Tower

14:40 – 15:00 **Registration**

15:00 – 15:10 **Opening address**
Man Wook Han (President, KOSEAA)

15:10 – 16:10 **Session I**
Chair: Yoojin Oh (Johannes Kepler University Linz)

15:10 – 15:30	Principles of Emergent Things at Complexity Science Hub *Eddie Lee (Complexity Science Hub)*
15:30 – 15:50	Supply Chain Analysis through the Global Trade Network *Daekyung Lee (ASCII)*
15:50 – 16:10	Inferential Network Science: Distinguishing Structure from Noise *Bukyoung Jhun (IT:U Austria)*

16:10 – 16:40 Coffee break

16:40 – 18:00 **Session II**
Chair: Sojung Han (University of Vienna)

16:40 – 17:00	CYBATHLON 101 & VIS Race in Action: Where Impairment Meets Innovation *Yeongmi Kim (MCI)*
17:00 – 17:20	Biodegradable Zn–Mg Alloys for Medical Applications: Corrosion Properties *Ruri Lee (TU Wien)*
17:20 – 17:40	How to Write a Scientific Manuscript Using AI: A Practical Guide with Detailed Prompts and Integration of Multiple AI Tools *Danhui Heo (University of Szeged)*
17:40 – 18:00	Assessment of Placental Villous Maturation through Image Analysis *Myunghoon Park (Semmelweis University)*

Program 2
Yori – Korean Dining, Wiesingerstraße 8, 1010 Wien

18:00 – 20:00 Dinner and networking

Abstracts

Principles of Emergent Things at Complexity Science Hub

Eddie Lee (Complexity Science Hub)

When we look at the natural world around us, we are surrounded by living processes that generate, manipulate, and use information, but we are yet still adapting the formal framework of information to understand Life, both biological and

social. This is our focus at the PoETs Lab (Principles of Emergent Things) at the Complexity Science Hub. Our research pulls on the thread of information as a concept with the goal of formalizing the problems in information theoretic terms and to shed light on the fundamental principles that govern the emergence of complexity in life and society.

Supply Chain Analysis through the Global Trade Network

Daekyung Lee (ASCII)

In today's highly interconnected global economy, analyzing and managing supply chains has become an increasingly critical challenge. This study analyzes the supply chain networks of key commodities such as steel and batteries using methods from complex network theory. By applying an extended gravity model to the global trade network, we identify clusters of countries exhibiting similar trade patterns, shedding light on underlying structural groupings. In addition, power tracing techniques, originally developed in the study of electrical systems, are adapted to trace how fluctuations in raw material production by major supplier countries influence the downstream availability of finished products. These results offer new insights into both the structural vulnerabilities and dynamic dependencies of global supply chains, supporting more informed assessments of their stability and robustness.

Inferential Network Science: Distinguishing Structure from Noise

Bukyoung Jhun (IT:U Austria)

Overfitting is a significant challenge in network analysis, especially due to the high dimensionality involved. For example, when modularity maximization is applied to an Erdős–Rényi network, it erroneously detects community structure where none exists. In contrast, Bayesian network inference avoids this issue entirely. In this talk, we introduce the Bayesian approach to network inference, which enables a systematic and principled identification of the macroscopic

organization within complex networks. This approach also allows for rigorous model comparison, helping select the model that best aligns with the observed data. By identifying latent structures within a network, Bayesian inference further supports the detection of missing or erroneous links, facilitating accurate network reconstruction.

Biodegradable Zn–Mg Alloys for Medical Applications; Corrosion properties

Ruri Lee (TU Wien)

Biodegradable metals such as iron, magnesium, and zinc are gaining significant attention as alternatives to permanent materials in orthopedic implants and vascular stents, primarily due to their ability to gradually degrade in the body. Among them, zinc and its alloys are considered especially promising because their degradation rate falls between those of iron and magnesium, making them potentially ideal candidates for medical applications where controlled degradation is crucial. This study investigates the corrosion behavior of two zinc-based binary alloys (containing 0.5 and 1 wt% magnesium) in three different states—extruded, homogenized, and deformed by High-Pressure Torsion (HPT)—using immersion and electrochemical tests in a simulated physiological environment. The results suggest that zinc and its alloys, with a biodegradability rate between iron and magnesium, show promising potential for use in orthopedic implants and vascular stents.

How to Write a Scientific Manuscript Using AI: A Practical Guide with Detailed Prompts and Integration of Multiple AI Tools

Danhui Heo (University of Szeged)

In the rapidly evolving landscape of artificial intelligence (AI)-assisted scientific writing, numerous tools offer opportunities to enhance productivity and quality throughout the manuscript writing process. Researchers are often overwhelmed

by the variety of AI tools and functions available, making it difficult to implement detailed workflows that maximize their benefits or determine which tools to use and how to combine them effectively. This presentation addresses these challenges by providing practical strategies for integrating multiple AI tools into scientific writing. By summarizing the unique strengths of various AI applications across different manuscript components and offering detailed prompts for each writing stage, the presentation demonstrates how these technologies can be systematically combined to make scientific writing more efficient and easier.

Assessment of Placental Villous Maturation through Image Analysis

Myunghoon Park (Semmelweis University)

Introduction: Chorangiosis is a placental vascular lesion characterized by excessive capillary proliferation in terminal villi, typically triggered by chronic intrauterine hypoxia. It is associated with adverse perinatal outcomes such as intrauterine growth restriction (IUGR), preeclampsia, and stillbirth. While capillary-level changes are well documented, the morphological effects on larger placental vessels remain underexplored.

Aim: This study aimed to investigate whether chorangiosis induces structural remodeling of large stem villous vessels in the placenta. Specifically, we analyzed differences in vessel diameter, lumen diameter, lumen area, and wall thickness between placentas with chorangiosis and those with normal histology. A secondary objective was to assess whether these changes vary across vessel size categories: thin, intermediate, and thick stems.

Method: Histological sections from eight placentas (four chorangiosis, four controls) were digitized and analyzed using image software. A total of 625 stem vessels were measured and classified by diameter percentiles. Morphometric parameters were compared between groups using Welch's t-test, following outlier removal via Z-score filtering.

Results: Chorangiosis cases demonstrated significant structural differences compared to controls. In intermediate vessels, lumen area was markedly reduced (7,951 μm^2 vs. 22,499 μm^2, $p < 0.001$), along with vessel diameter (106.89 μm vs. 122.91 μm, $p = 0.013$) and lumen diameter (55.09 μm vs. 78.67 μm, $p < 0.001$).

Wall thickness was consistently increased in all stem categories: thin (20.34 μm vs. 10.83 μm, $p < 0.001$), intermediate (25.84 μm vs. 20.45 μm, $p = 0.002$), and thick (33.79 μm vs. 26.96 μm, $p = 0.033$)..

Conclusion: Chorangiosis involves not only terminal villous capillary proliferation, but our results show luminal narrowing and concentric remodeling of large placental vessels also. These changes likely contribute to placental hypoperfusion and exacerbate hypoxia-driven angiogenesis. Understanding these vascular adaptations may provide novel insights into the pathophysiology of chorangiosis and inform clinical management of high-risk pregnancies.