**Title**:
User-Cluster-Centric Cell-Free Massive MIMO Systems for Beyond 5G

**Name**:
Sijie Xia (Dr.)

**Affiliation**:
Assistant Professor (Special Appointment), Research Institute for Semiconductor Engineering (RISE), Hiroshima University.

**Abstract**:
This talk presents recent research on user-cluster-centric (UCC) cell-free massive MIMO systems for Beyond 5G wireless communications. Unlike conventional centralized massive MIMO, which suffers from excessive computational complexity and vulnerability to blockage at high-frequency bands, the UCC approach employs cluster-based antenna coordination to achieve a better balance between performance and scalability. We begin by introducing clustering strategies that adapt to user distribution and mobility, followed by interference-suppression techniques based on zero-forcing and adaptive user selection. To further enhance reliability and efficiency, we also discuss graph-coloring-based pilot assignment and a capacity–fairness tradeoff power allocation scheme. Finally, future research directions and remaining challenges for practical deployment are highlighted.

**Biography**:
Sijie Xia received his B.E. degree from Zhengzhou University, Zhengzhou, China, in 2018, and the M.E. and D.E. degrees from Tohoku University, Sendai, Japan, in 2021 and 2024, respectively. Since October 2024, he has been an Assistant Professor (Special Appointment) with the Research Institute for Semiconductor Engineering (RISE), Hiroshima University. His research interests include signal processing, resource allocation, and beamforming for distributed and cell-free massive MIMO systems.