



Pursuing the Ultimate Performance of Vacuum Photo-Transistors and Establishing a basis for Ultra-High-Capacity Seamless Optical-Wireless Networks

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**Grand Challenge and Goal:**

**Developing Vacuum Photo-Transistors for Seamless Terabit-Level Optical-Wireless Network and Fostering Global Talent in Communication Systems**

**Summary:**

**Development of the Innovative "Vacuum Photo-Transistor"**

- Analysis of terahertz wave generation using a vacuum electron transport model.
- Wafer bonding technology for vacuum in semiconductor devices.
- Application of photocathode technology to devices.

**Ultra-High-Capacity Seamless Optical-Wireless Network**

- Terahertz phase control of the vacuum photo-transistor.
- Beamforming and steering with phased arrays.
- Demonstration of seamless connection from optical to 300 GHz wireless networks.

**Social Impact:**

- Major advancements in communication infrastructure with innovative device development.
- New opportunities through interdisciplinary collaboration.
- Cultivation of skilled researchers for the communication industry.

