



Appendix

(Research fields and sub-topics)



Semiconductor

1. **Advanced VLSI** (beyond 1 nm): materials, epitaxy, devices, and technologies
2. **Advanced packaging**: heterogeneous integration and interconnect, 3D/2.5D IC, chiplet stacking etc.
3. **Advanced memories**: high capacity and low access time
4. **Power** devices and integrated circuits
5. **Microwave/high-speed** devices and circuits for 6G applications
6. **Advanced materials**: non-Si semiconductors (2D, soft materials etc.), multifunction metals & insulators, magnetic/spintronics materials & devices
7. **MEMS sensors and actuators**: more-than-Moore
8. **Nanophotonics**: metasurfaces, biomedical/quantum applications, semiconductor lasers etc.
9. **Manufacture and metrology equipment & facility**: airborne molecular contaminations (AMCs) control, micro-contamination in wafer/mask handling system (FOUP, EUV Pod etc.), MEMS probing and wafer testing
10. **Taiwan development experience, supply chain** management and resilience

Quantum Technology

1. **Quantum computing materials, devices and architectures:** emergent quantum materials/quantum dot/solid state/Si/superconducting qubits
2. **Cryo devices and circuits:** cryo-CMOS modeling and circuits, interconnect, RF circuits at cryo operation, microwave/photonic transmission for qubits
3. **Quantum memory, quantum sensing**
4. **Optical quantum computing and communication:** devices and algorithms
5. **Quantum and nano photonics** for quantum technology
6. **Quantum information and communication**
7. **Hybrid quantum network**
8. **Quantum software technology, cryptography, machine learning**
9. **Certification and quantification of quantum properties:** entanglement, steerability, measurement incompatibility
10. **Qubit-based quantum simulation**

AI & Data Science

1. Efficient and trustworthy **deep learning**
2. Multimodal **machine learning**
3. Intelligent **edge computing**
4. Emerging applications for **generative AI**
5. Efficient **mining on data streaming**
6. Technologies for **advanced computer vision**
7. **AI hardware**: LLM (large language model) accelerator, in-memory computing, low precision/analog computing
8. **AI applications**: healthcare, sustainability, manufacturing, cyber security, robotics, autonomous/smart vehicles, 6G (semantic communication), remote sensing, engineering, materials, agriculture, education, predictive analytics and market insights, archaeological science etc.
9. Human-centered and sustainable AI

Sustainability

1. **Green energy** technologies: wind energy, hydrogen energy technology, smart grid, solid state transformer etc.
2. **Energy storage**: battery & management, high-efficiency charging & discharging, renewable energy integration etc.
3. **Carbon** reduction, capture, storage and utilization for net zero
4. **Nature based solutions**- data, assessment, analysis and strategies
5. **Circular economy**
6. **Water** management and sustainability
7. **Transportation electrification**: electric vehicle, charger, vehicle-to-grid (V2G)...
8. **Innovative & intelligent monitoring/control of pollutants** (in air, ocean etc.)
9. **Disaster** prevention and recovery
10. **Carbon credit** certification and trading
11. Urban sustainable development , sustainable enterprise management and climate-related financial disclosures , fostering sustainability and personal growth through cross-disciplinary participation and practice