

## **Innovation in Australia and Collaboration between China and Australia.**

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### **Abstract**

Society needs to be shaped to grasp the significant opportunities that are presented in the 21<sup>st</sup> century and this will be done by realising the potential of the best students and developing the best researchers who can be leaders and solve many global problems in Photonics. The Fourth Industrial/Smart/Intelligent Revolution (Cyber Physical Systems) involves: Rapid advances in automation and data exchange. Cyber-physical (robotic) systems. Internet of Things. Nanotechnology. Artificial Intelligence. Cloud & cognitive computing. We need to meet challenges and capture opportunities presented by these rapid changes and channel the positive impacts of Disruptive Technologies on our society. The translation and Commercialisation of research requires both Industry Engagement and the execution of high impact research. Industry engagement is normally gained through the interaction between researchers and key-end-users and its purpose is to support the transfer of knowledge, technologies, methods and resources. International partnerships to diversify the engagement and provide a springboard for innovation in every industry sector, public or private will be pursued.

China-Australia High-Tech Industrialization Association (AHTIA) that promotes collaboration between Australia and China in High-tech industries. AHTIA-CSOE tackles the challenges of the 21<sup>st</sup> century by developing commercially oriented innovative researchers who address important global challenges. Case Studies presented include: Strategic Alliance between The University of Sydney and Tsinghua University to undertake joint research in Energy Networks with State Grid, South China Grid. Strategic Alliance between The University of Sydney and Shanghai JiaoTong University that involves Engineering and Medicine.

*Innovation in Engineering Education at The University of Sydney* including will be described: *The Master of Complex Systems* provides expertise to model, analyse and design resilient technological, socioeconomic and socioecological systems and *The Master of Data Science* draws knowledge from data to drive business decision-making and to develop analytical and technical skills and to use data science to guide strategic decisions in areas of interest.

*Innovation in Photonics Research at The University of Sydney* will be described: Hybrid plasmonic waveguide for on-chip photonic devices. Low latency, ultrahigh bandwidth signal processing. Signal distortion compensation by ultra-fast nonlinear optical devices. Mode-division multiplexing. Developing novel mid-IR sources on a compact chip-scale platform. Single photon generation for large-scale photonic quantum systems. Silicon photonics nanofabrication. Integrated microwave photonics. Fibre-optics and photonics engineering. Photonics and advanced optical techniques for information systems. Non-invasive biosensing technologies. Optoelectronic sensing technology. Nonlinear fibre optics. Novel Bragg gratings for filtering and data format conversion. Localisation of capsule endoscope. Photonic crystals for terahertz applications. Optically-controlled phased arrays.

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