

Third Laureate, Fundamental Research

- **Research Work Title:** Single molecule imaging of T cell receptor signaling
- **Researcher:** Prof. Katharina Gaus
- **Country:** Australia
- **Field:** Cellular Immunology
- **Scientific Affiliation:** Research Fellow, University of New South Wales



Abstract:

Antigen recognition by the T cell receptor (TCR) is a hallmark of the adaptive immune system. When the TCR engages a peptide antigen, signals are transmitted via the associated CD3 complex on which T cell fate decisions are based. How the extracellular antigen recognition event leads to intracellular phosphorylation remains unclear. We address this problem with single-molecule localization microscopy. For example, distinguishing between triggered and non-triggered TCR-CD3 complexes in the same cell, we could propose a model in which antigen recognition is first translated into receptor clustering and then the density of receptor nanoclusters is translated into signaling. This model may explain how T cells can respond to both the affinity and dose of antigens. We also developed novel FRET sensors to monitor the rate of receptor clustering and membrane charges.

Biography:

Prof. Katharina Gaus is an NHMRC Senior Research Fellow at the University of New South Wales and Head of the EMBL Australia Node in Single Molecule Science. She is also the Deputy Director of the ARC Centre of Excellence in Advanced Molecular Imaging. She received her PhD from the University of Cambridge in 1999 and has led an independent research group since 2005. Her multidisciplinary research group investigates signal transduction processes in T lymphocytes with advanced fluorescence microscopy approaches. She was awarded the Young Investigator Award from the Australia and New Zealand Society for Cell and Developmental Biology (2010), the Gottschalk Medal from the Australian Academy of Science (2012) and the New South Wales Science and Engineering Award for Excellence in Biological Sciences (2013).

