

Dr Anya Salih

Position: Research Fellow

Organisation: The University of Sydney's Electron Microscope Unit/Australian Key Center for Microscopy & Microanalysis/NANO

Anya has been researching the biological functions, diversity and optical properties of fluorescent protein pigments of reef corals. Tropical coral reefs are some of the most colourful assemblages of organisms and the Australian Great Barrier Reef corals contain an abundance of multi-colour fluorescent proteins that are close relatives of the jellyfish green fluorescent protein (GFP).

In recent years, there has been a dramatic development of the uses of multi-colour fluorescent proteins as fluorescent reporters for detection of events in living cells and tissues and there is much interest in identifying novel GFP-like proteins and in understanding their roles in marine organisms.

When Anya first researched these proteins with other colleagues, she identified the mechanism of their photoprotection in reef corals. They also showed that coral GFPs reduce the degree of mass bleaching – a stress-related pathological conditions of reefs induced by global warming-related temperature increases.

Between 2000-2005, Anya working with her colleagues discovered several novel types of these proteins and found that multi-colour pigment arrays are naturally arranged in cells to channel light energy via FRET (Forster Resonance Energy Transfer). Nowadays, FRET is routinely used as fluorescence-based cellular assay to track proteins and genes in living cells and it appears that nature has adopted the strategy to channel light energy inside cells.

Coral GFP-like proteins expand the colour palette available for FRET applications. Extending this research to both fluorescent and non fluorescent GFP-like homologues, Anya discovered a range of photoactive coral proteins that change colours on irradiation by appropriate light wavelength. As a result of a collaborative group project, with Guy Cox, Filip Braet of EMU/NANO, molecular biologists Mikhail Matz and Joerg Wiedenmann, other researchers from UTS, Macquarie, Melbourne, Monash universities and Leica Microsystems, with funding support from the FABLES Network, much progress has been done in characterizing a range of novel proteins with superior molecular, biophysical and optical characteristics to those of commercially available GFPs.

In an ARC Discovery project for 2006-2008, Anya will team with molecular scientists, Joerg Wiedenmann and Mikhail Matz, optical specialist Guy Cox, as well as Prof. Robert Hoffman of AntiCancer Inc, to develop the GFPs for use as advanced fluorescent probes for biomedical imaging and anti-cancer drug research.