CIBA Detective

Associate Professor Mark Breese
Young Researcher Award 2006 & IPS Premier Award 2005 (Physics Research)

Mark Breese is a man who goes places. He was educated in the University of Manchester for both his undergraduate and postgraduate degrees. Following that he spent a few years in Oxford University, a few years in Australia, and a year working in Portugal, in the University of Lisbon. Five years ago he joined the NUS and has carved a niche for himself in his field of Ion Channeling Microscopy by walking away with awards for the last two years viz. NUS Young Researcher Award 2006 and IPS Premier Award 2005 (Physics Research)

“Ion channeling microscopy is a way of looking at the crystalline quality of the material to see if there is any fault in it. We have made advances in ion channeling techniques as we are now capable of imaging defects at a very high spatial resolution of a few tenths of a nanometer. Our team at the Centre for Ion Beam Analysis (CIBA) has developed a method of focusing high energy beams to spot sizes as infinitesimal as 50 nanometers, or 50 millionth of a millimeter. This increases its sensitivity, that it is able to locate tiny defects in thick layers of crystals. This technique is far superior to other microscopy techniques, which have limited analytical depth.”

Mark Breese’s research has led to greater understanding of the interactions between high-energy ion beams with crystal lattices and defects. He discovered that a crystal containing defects results in better channeling behavior and better coherency than a perfect crystal.

“Yes, the results have applications in many areas. We are trying to find an alternative form of microscopy to transmission of electron microscopy and all the other ways of looking at crystal defects. The focus is always towards a better way of doing it. It is important to be able to analyse crystalline material in semiconductors. Also in diamonds, for the purpose of grading the gem stone.”

Work aside, the gem in Breese’s life is last year’s Christmas present – his baby daughter. His other interests like music, literature, traveling and astronomy have to take a back seat for now. As for tomorrow (literally, the day after the phone interview), he is bringing her home to England to visit his family. But after the holidays, he will be back at CIBA, stubbornly and with all his dedication, continuing his research in trying to make imaging capability even better by producing higher resolution, through looking at different types of defect structure.