

Bursaries

THE CSIR'S BURSARY programme caters for selected full-time students in specific fields. Their studies are paid for by the CSIR. High priority and demand skills areas to be addressed are at BSc and BSc Hons levels.

Most organisations view bursaries as part of their corporate social responsibility drives. The CSIR invests in this human capital development (HCD) stream because of severe shortages in numbers and quality from established tertiary education institution (TEI) streams, resulting in strong competition for potential science, engineering and technology (SET) candidates at entry levels. The CSIR must ensure security of supply over the longer term, primarily for CSIR requirements but also to strengthen the national pool and pipeline.



Tshepiso Mothibinyane



"It's been a roller-coaster ride, but I have enjoyed every moment of it thoroughly!"

Science-driven bursar shifts boundaries in pursuit of dreams

Dreams do come true. Some are easy to achieve, while others require one to go that extra mile to realise them. When her parents' financial constraints nearly halted her dreams to study, Tshepiso Mothibinyane decided to go the distance in pursuit of her goals.

TSHEPISO MOTHIBINYANE'S determination to be a scientist knows no boundaries. When her parents told her they could not afford her University of Cape Town (UCT) fees, where she had been accepted the year before, she decided to take a 30-hour long train trip to Cape Town without their consent. Once there, she managed to hold on to her residence bed long enough for her students' financial assistance application to be approved. It had taken her three agonising months on a waiting list before the loan was finally given the stamp of approval.

Tshepiso is currently preparing to study towards her PhD. She obtained her MSc in physics in April this year at the Nelson Mandela Metropolitan University (NMMU) through a CSIR bursary. "I first heard about the CSIR after obtaining my Honours in physics at UCT in 2004," she says.

"I was listening to Metro FM when I heard Khungeka Njobe, current CSIR Group Executive for R&D Outcomes and Strategic Human Capital Development, talking about

bursary opportunities at the CSIR," she adds. Her only other link with the CSIR was a friend who was doing vacation work at the CSIR. It was this acquaintance who introduced Tshepiso to Dr Andrew Forbes, a principal researcher at the CSIR National Laser Centre. "I was interviewed, offered an internship position and also awarded a bursary," she says. "He took an instant interest in my work, and has been supportive since," she adds.

Her MSc research focused on developing infrared (IR) detectors that can operate in the wavelength ranges of 3-5 μm and 8-12 μm . "These two IR wavelength ranges correspond to the transmission windows in the atmosphere where long-range detection is of interest," she says. "This is particularly relevant for military and security applications, where surveillance and long-range monitoring are of importance," she adds. She says the project looked at ways of replacing mercury cadmium telluride (HgCdTe), the dominant semiconductor material in the 8-12 μm range, with indium arsenide antimonite (InAsSb), as it is more

stable, uniform and has a cut-off wavelength that can be tuned in a wide range (3-10 μm).

Currently, Tshepiso's research leader, Andrew, and University of Zimbabwe researcher, Dr Gift Katumba, are involved in a project studying the effects of laser heating on industrial diamonds. "Industrial diamonds are typically used in daily industrial operations, such as drilling or cutting," says Tshepiso. Her team has observed how friction causes diamonds to reach very high temperatures in a regular drilling experiment. Preliminary findings assume that the high temperatures lead to stress-induced damage as a result of the dislocations of the lattice. "In this project, we aim to study the influence of the temperature-driven defects in the diamond and check whether the diamond changes physically or chemically when heated, in order to improve the process."

In future, Tshepiso sees herself assuming a mentoring role. "If I look at what the CSIR has done for me, I feel obliged to give back – particularly to young African women out there." She says she feels inclined to urge this particular group on, as she knows how little their communities encourage them to take up maths and science at school. "As a young girl growing up in Taung, a village in the North West, I experienced people frowning upon me and others with an interest in these subjects," she says. "Subsequently, only 15 girls in my matric class stuck with maths and science."

She says she attributes much of her success – "so far!" – to her parents' contribution and her husband's and siblings' support. "Even though my parents did not have the funds to pay for my 'varsity fees, they still made sure that I had enough in my pocket to buy food and other necessities," she says.

"I also commend Dr Forbes, along with my MSc supervisors, Professor Japie Engelbrecht and Reinhardt Botha (NMMU) for their incredible support and encouragement," she says. "It is this support that set me apart from my peers when I won the Most Outstanding Poster Presentation award at the 50th Annual Conference of the South African Institute of Physics in 2005."

Looking back, Tshepiso says she wouldn't change a thing if she had to do it over again. "It's been a roller-coaster ride, but I have enjoyed every moment of it thoroughly!" **– Lehlohonolo Mokheba**