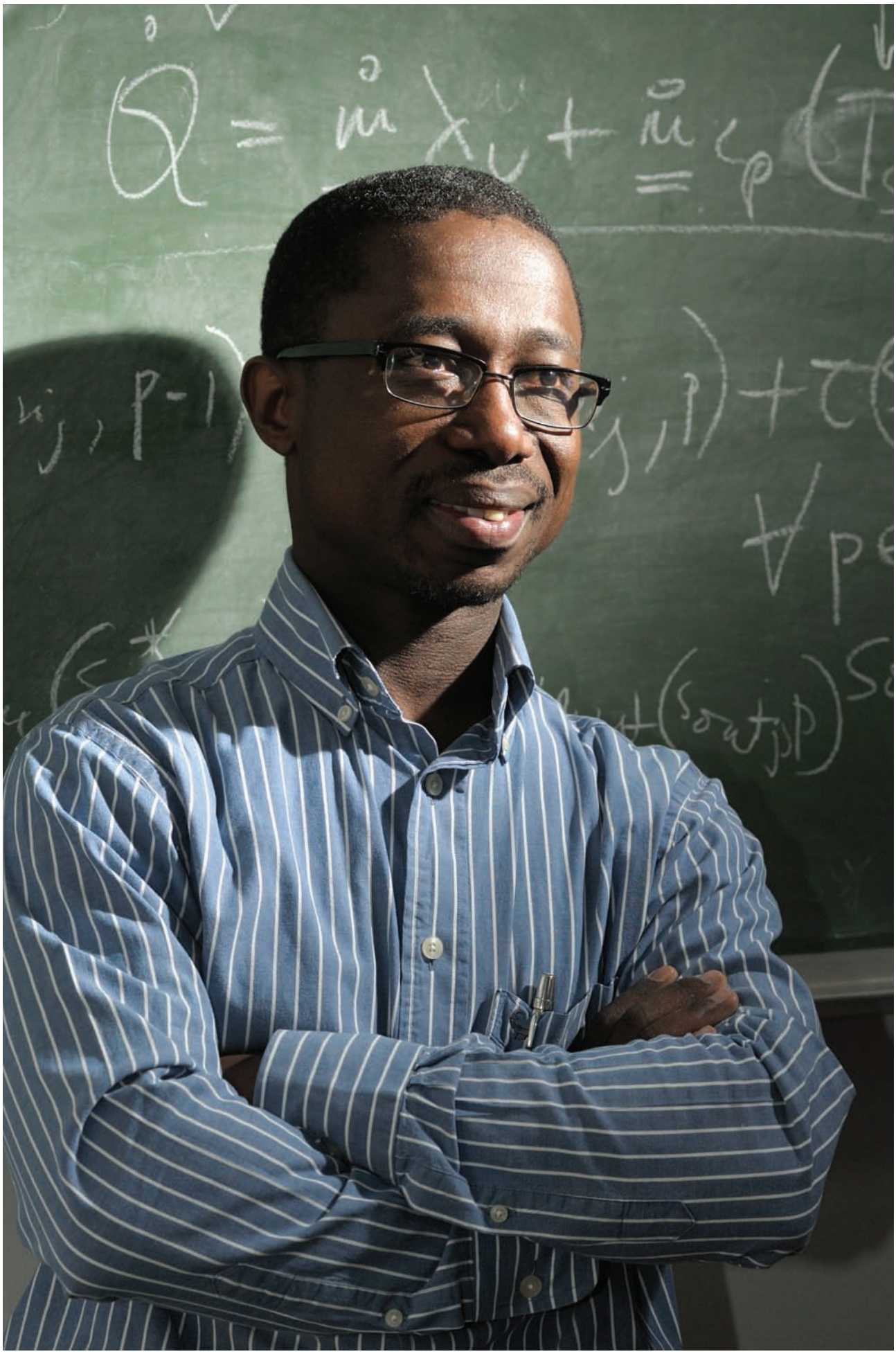
→ *Prof Thokozani Majozi*



NSTF winner changes thinking of the chemical industry

Prof Thokozani Majozi, the Department of Chemical Engineering's most recent winner of a National Science and Technology Forum (NSTF) Award, is fundamentally changing aspects of the chemical engineering industry with his innovative techniques. He hopes to bridge the gap between academic achievement and industrial applications to truly improve the lives of the people he serves.

Prof Majozi was recognised at this year's NSTF Award ceremony for his individual contribution to chemical engineering through research and its outputs over the past five to ten years. He received the award for his research, which led to the development and application of new techniques in batch and continuous chemical process integration, relating to freshwater use and wastewater generation.

Prof Majozi has made significant contributions in the area of process integration. Among other things, he developed a mathematical technique for wastewater minimisation and heat integration in multipurpose batch chemical plants that are characterised by complex recipes. This includes the development of a framework for the synthesis of cooling water and steam system networks.

"In any chemical plant there are cooling and heating streams that serve as heat sink and heat source, respectively. Consequently, these are part of the chemical process. A steady supply of both streams is needed to keep the process going," he says.

In the past, the cooling and heating networks were considered separately. "No one had looked at the process as a whole. However, we have seen the benefits of a comprehensive integrated system."

While both the heating and cooling networks are complex in their own right, they are even more complex when integrated. Prof Majozi believes that this is the reason research on integrated systems was avoided in the past, even though the traditional discrete methodology is suboptimal. Developing methods and tools to analyse the systems in a more systematic fashion creates an optimised plant.

The technique developed for batch plants is based on a state-sequence-network recipe representation that yields structurally efficient mathematical models, while the synthesis methods rely on an insight-driven graphic platform. Typically, the techniques have been successfully applied in multinational industries with more than 20% savings in freshwater use and wastewater generation.

"It is an overriding ambition to see these methods accepted as a standard. The chemical industry is one of the biggest contributors of pollution due to poor process design. I recognise that we are fundamentally changing the thinking of industry and that it will take time to accept new techniques.

> "At some point, every scientist must ask how they are improving the lives of the people they serve. We can only make an impact if new developments and information are accepted. Currently, academic work is too isolated and academics need to bridge the gap," says Prof Majozi.

This is not the first time that Prof Majozi has received an award from the NSTF. In 2006, he was recognised in the category distinguished young black researcher in the last five to ten years.

He also received the prestigious President's Award of the National Research Foundation (NRF) in 2007 and 2009. In 2008, the University of Pretoria recognised him by way of a Leading Minds Centenary Award, and in the same year he also received the S_2A_3 British Association Medal.

More recently, in 2010, he was awarded the Bill Neal-May Gold Medal for Outstanding Achievement and International Recognition. This award was made by the South African Institute of Chemical Engineers (SAIChE).