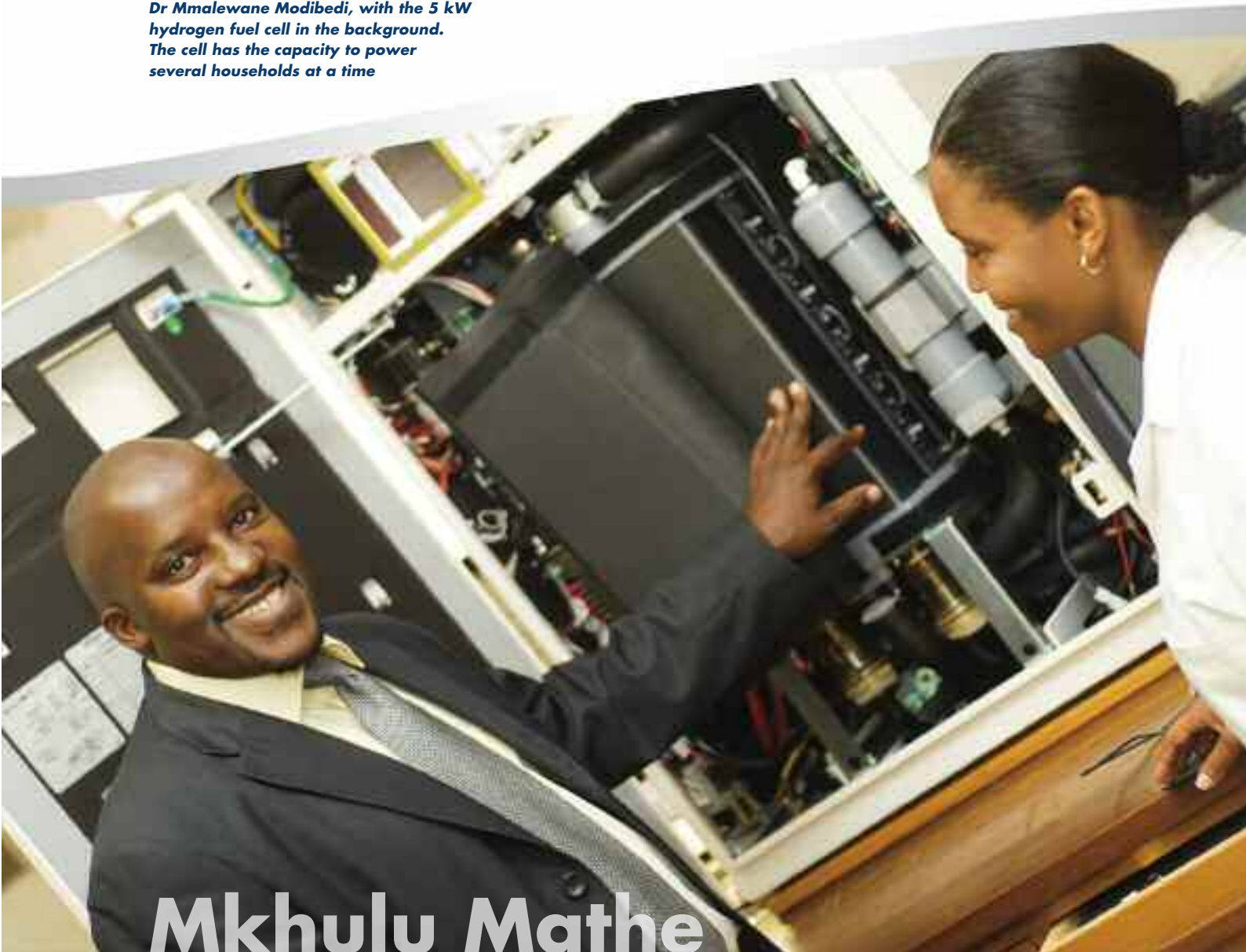


Management and leadership development programme

THE SUCCESSFUL ACHIEVEMENT of the CSIR strategy is directly linked to the quality of leadership and management at all levels in the CSIR. This is a developmental programme for CSIR managers and leaders to acquire the competencies needed for greatness in science leadership.

Dr Mkhulu Mathe and colleague, Dr Mmalewane Modibedi, with the 5 kW hydrogen fuel cell in the background. The cell has the capacity to power several households at a time



Mkhulu Mathe

“Because it feels good to do good”

Successful scientists are rarely known for their philanthropic attributes, for leaving a promising career in the United States to return and contribute to South Africa or for actively organising relief efforts for flood victims because “it feels good to do good”. Dr Mkhulu Mathe is such a person.

Dr Mkhulu Mathe is leader of the CSIR’s energy and processes area that conducts research and development of next-generation energy sources specifically directed at materials science and chemistry to improve performance and reduce costs



“If you invest in people, you not only add to their skills base, you build loyalty and show your intent to retain them.”

A HUMBLE AND COMPOSED individual, Mkhulu is proud of his Free State roots where he started his career as a maths and science teacher in Kroonstad in the early 1980s. Exploring each opportunity to further himself and ultimately uplift his community, he successfully applied for the Educational Opportunities Council Scholarship, a bursary scheme focusing on educating Africans for the future. The young Mkhulu left for Elmira College in New York where he received his Bachelor’s degree in chemistry in 1988.

In 1998 he received his MSc in chemistry from the University of Transkei. His parents were very proud of their son, the first graduate in the family. At that stage he realised that his teaching career was taking a natural turn into a different direction. His supervisor at the University of Transkei encouraged him to immediately continue with his PhD studies while he still had the momentum of the MSc. Supporting himself with the graduate assistantship programme

and teaching part time, Mkhulu obtained his PhD in analytical chemistry/electrochemistry from the University of Georgia in 2003.

Finances and motivation

“If it was financially more lucrative, many more South Africans would have pursued at least a Bachelor’s degree,” Mkhulu believes. “There are so many bright young kids with promising futures, but financial restrictions and family responsibilities often make it very difficult.” Given these realities, how does he motivate students and young researchers to pursue postgraduate qualifications? “I challenge them – what is the fire in your belly? Find it, and pursue it. I show them their own potential and convince them that they have time on their side. I tell them that a higher degree will ultimately earn more money. It is simple economics!”

Fuel-cell technology

Returning to South Africa, Mkhulu commenced his career at the CSIR as

a scientist, "Chemistry and mathematics have always been my first love," he says, "and doing fundamental fuel-cell research was right up my alley." His leadership qualities soon led to his promotion to research group leader. He was also a member of the team who drafted a three-year research plan for fuel-cell research for the energy and processes competence area where they are currently doing research on membrane-electrode assemblies, catalytic coatings and hydrogen storage.

Fuel-cell technology is increasingly being seen as an alternative to traditional power sources and is used in prototype applications to power vehicles, cell phones, homes, commercial properties, computer laptops, household appliances and industrial machinery.

Leadership and management

Mkhulu has been the CSIR competency area manager in energy and processes since late 2006. "I soon realised that being a good scientist does not connote being a good manager and leader. I had to better equip myself, especially in terms of managerial and leadership skills." He thus promptly applied for participation in the CSIR Management and Leadership Programme. "Managing your team's future and making decisions about large sums of research money are very different from managing research," he confesses.

WHAT IS THE HYDROGEN ECONOMY?

The hydrogen economy is most probably the future replacement of our current fossil fuel (oil) economy. It is anticipated that hydrogen will be the energy carrier in especially vehicles and powering our homes. One 5 kW hydrogen fuel cell, like the one at the CSIR, is enough to power several houses.

Energy is generated when hydrogen and oxygen are combined. It has only one by-product, namely water. "This is truly clean, non-polluting energy," Mkhulu says.

Demonstration projects are in operation worldwide. In the United States and Canada, there is a development of the so-called hydrogen highway where hydrogen filling stations are erected next to petrol/diesel filling station and a number of hydrogen-driven cars were given to participating individuals and families to test the concept in real-life situations. In a typical family car, 4 kg of hydrogen – at a cost of R10 per kg – is enough to last about 300 km, similar to a traditional 'full tank of petrol'.

Mkhulu is one of the first candidates in the CSIR Management and Leadership Programme, which currently entails the Management Advanced Programme (MAP) presented by the University of the Witwatersrand. It is an intensive nine-months programme structured to cover all aspects of management, including financial accounting and management, human resources, economics, strategy and marketing. Upon completion of the MAP, Mkhulu has to report back to the CSIR and make recommendations in terms of management and leadership. The intention is that a candidate should add significant value to his or her managing abilities. Supported by the CSIR, he also attended the acclaimed Stephen Covey's Leadership course earlier in 2007.

Human capital development

"I am really happy that human capital development is such a serious priority in

our organisation," Mkhulu says. "If you invest in people, you not only add to their skills base, you build loyalty and show your intent to retain them. Only a suitably-equipped employee can really make a value-adding contribution to the organisation."

He occasionally lectures on fuel cells at the University of Pretoria, and offers supervision to Master's and PhD students who seek his assistance. "It works both ways," he believes. "I offer my expertise and assistance, and together we produce papers and new technology to add to the growth of our competency area."

Mkhulu believes leadership is about setting the example and management is about convincing people of their own potential, the value of their own conviction and pursuing success, but most of all to do good, because it feels good to do good.

– Renatè Janse van Vuuren

WHY SOUTH AFRICA CAN BE A LEADER IN A FUTURE HYDROGEN ECONOMY

Platinum is the catalyst* of choice and given that South Africa is home to about 75% of the world's platinum, our country is the ideal supplier. "I foresee that the way the middle east countries are supplying oil, South Africa will be supplying platinum for hydrogen fuel technology. It is our responsibility as a country to be innovators ahead of being technology importers. This is why the present national hydrogen and fuel-cell strategy emphasises HCD; we need to develop the industry and skilled people," says Mkhulu.

*A catalyst 'facilitates' a chemical reaction. In this case, the hydrogen molecule reacts to platinum to produce hydrogen protons. The protons travel through the proton exchange membrane and on the other side combine with oxygen molecules. This reaction between the hydrogen protons and the oxygen molecules produces energy, with water as a by-product.