

... who is selected among top 16 scientists on the continent, hopes that in future man can derive energy and fuel needs from the sun and water

# A crusader for sustainable energy

Dr Justus Masa

By Billy Rwothungeyo

Dr Justus Masa's appreciation for nature started when he was growing up in Buginyanya in Bulambuli, Bulambuli district on the slopes of Mount Elgon, in eastern Uganda. When he was still a pupil of Buginyanya Primary School, Masa believed that only through science and technology, would mankind keep the earth's beauty intact.

Masa's insistence on his belief has earned him elite recognition as he has been selected to be among one of the top 16 scientists in Africa, by the Next Einstein Forum.

Named after the iconic scientist Albert Einstein, the fellowship recognises Africa's most outstanding scientists and technologists under the age of 42, whose research has the potential to solve some of the world's biggest problems.

The Next Einstein Forum is an initiative of the African Institute for Mathematical Sciences (AIMS) in partnership with Robert Bosch Stiftung. The forum connects leaders in science from Africa and all over the world to find ways of advancing science.

## Who is Masa?

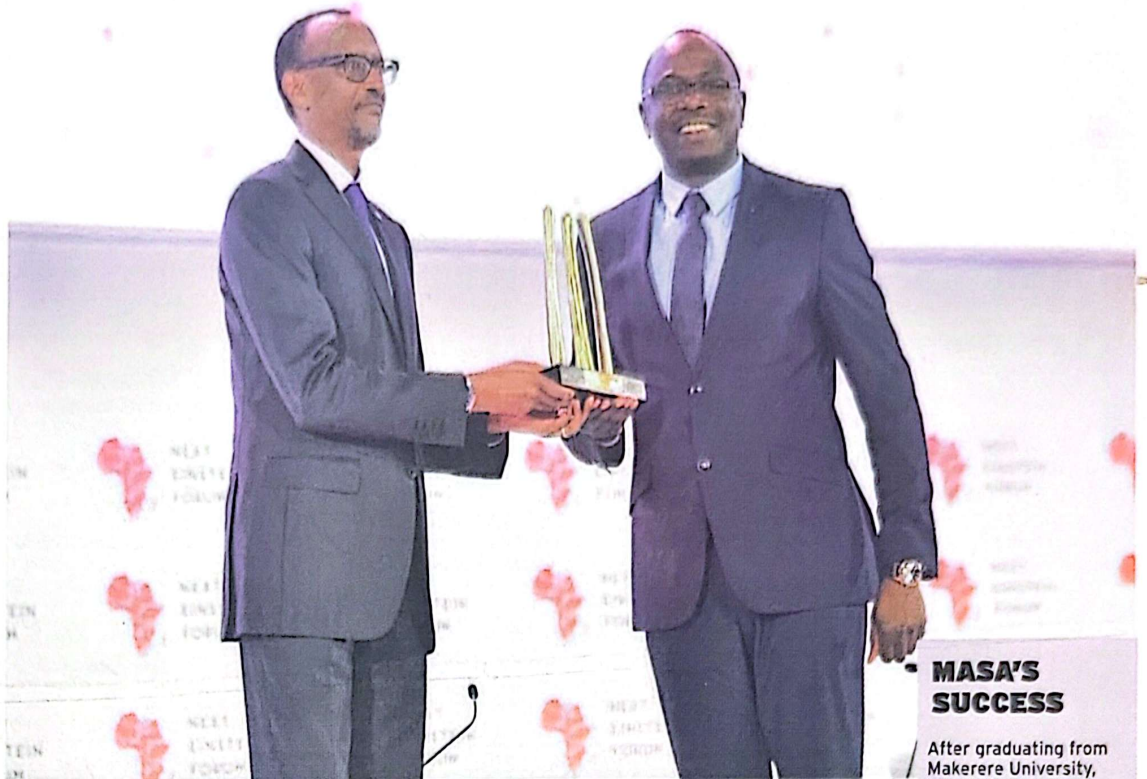
Today, the electrochemist is at the forefront of research on advanced systems for electrochemical energy conversion and storage to renewable energy, specifically solar energy.

The lecturer in the department of chemistry is setting up a laboratory for electrochemistry, energy and corrosion research at Kyambogo University. He hopes the lab will serve as an interdisciplinary centre for energy research and climate protection worldwide.

He is also spearheading research on the prospects of establishing a chlor-alkali industry and integrated allied industries using the salt deposits from Lake Katwe.

"If this dream is realised, it will lead to the creation of hundreds of jobs, stop importation of caustic soda and chlorine products for water disinfection and several other products," he says.

As fears over global warming continue to grow, Masa has become a crusader for clean energy. He is researching ways of developing functional electrochemical energy



Dr Masa (right) receiving the Fellow Award from Rwandan President Paul Kagame during the Next Einstein Forum Global Gathering at the Kigali Convention Centre in Kigali Rwanda recently

storage and energy sources for mini-grid and off-grid applications.

"Our insatiable demand for energy has polluted the earth and the consequences jeopardise our existence. It is, therefore, not a matter of choice, but imperative for us to shift to clean, environment-friendly and sustainable energy. This is one of the grand challenges of the 21st century for which I am pleased to devote my intellect, time and effort," he says.

"As long as the challenge of availing clean, affordable and environmentally-friendly energy remains unresolved, I will continue to actively pursue research in the field of clean and sustainable energy and remain committed to teaching and advocacy at all levels of society," he says.

**He has earned it**  
Masa has been a lecturer at Kyambogo University since 2015. He is principally exploring two avenues

*"Hydrogen obtained from water will be the dominant fuel for most of our energy needs," Masa*

of electrochemical energy conversion and storage to renewable energy resources, specifically solar energy, to maximise the energy harvested from the sun.

"The first one is to use modern batteries that can store much more energy than lead acid ones. An example of such an innovation is the redox flow battery. The main distinction of this battery from conventional ones is that the energy chemicals are stored outside the battery in gigantic tanks, so the capacity is limited by the volume of the tanks," he explains.

Such batteries would be suitable for mini-grid energy storage and for storing solar energy for small communities and institutions in Uganda such as schools and hospitals.

"The second approach is to use solar energy, or energy from another renewable source, to produce hydrogen gas as a portable energy fuel from water through a process called electrolysis. The produced

hydrogen can then be used in a device called a hydrogen fuel cell, here the hydrogen reacts with oxygen from the air to produce electricity, releasing recyclable water as the only waste product," Masa explains.

Masa adds: "My dream is to see that the future human being can derive all his energy needs from solar energy and water. Secondly, hydrogen obtained from water will be the dominant fuel for most of our energy needs."

## A story of persistence

Masa's story is one of persistence. He completed O'level at Mbale Secondary School in eastern Uganda, where he was one of only six candidates out of 498 to pass in division one. He, however, did not join his first choice, Nabumali High School for his A'level.

He went to St Joseph's College Layibi in Gulu where he completed A'level.

He then joined Makerere University on a government scholarship to study physics, mathematics and chemistry. While still a student at university, Masa emerged second in the national mathematics contest in 2001 and fifth in 2002.

"Afraid of being unemployed due to the under-appreciation of fundamental sciences, I decided to major in industrial chemistry."

Masa, is a member of the International Society of Electrochemistry and has published more than 70 peer-reviewed papers and two book chapters.

## MASA'S SUCCESS

After graduating from Makerere University, Masa joined the Fish Oil sub-project under the framework of the Norwegian Programme for Development, Research and Education support to Makerere University.

"I received a prize for demonstrating the extraction of omega-3 rich oils from the local fish in Lake Victoria," he said.

In 2005, he won a scholarship from the Germany Academic Exchange Service (DAAD) to study a master's degree in chemistry at Makerere University.

A year later, Masa undertook a research fellowship at Ruhr University Bochum in Germany.

After the master's degree, he won yet another scholarship from the DAAD to pursue a PhD at Ruhr University, which he completed in 2012, graduating with a distinction, which is the highest grade, summa cum laude.

In 2013, he was a visiting scholar at the University of Oxford, one of the most prestigious universities in the UK.

## WHAT OTHERS SAY

**Dr William Wanasolo, senior lecturer in the department of Chemistry at Kyambogo University**

Masa is hardworking and innovative. He has done extensive research in electrochemistry and we are honoured to have him at the university."

**Dr Justus Kwetegyeka, Head of chemistry department at Kyambogo University**

I know Masa well. He was my assistant at one time. He is hardworking and meticulous and the sky is the limit for him.