Acceptance Speech of

PROFESSOR SIR RICHARD HENRY FRIEND

Co-Winner of the 2009

King Faisal International Prize for Science

31st Ceremony

Saturday 28 March 2009 (1.4.1430H)

Your Majesty, Custodian of the Two Holy Mosques,

King Abd Allah Ibn Abd Al-Aziz

Your Highnesses

Your Excellencies

Distinguished Guests

The winners of the King Faisal Prize for Science are indeed an exclusive and distinguished group. As a bystander in the past, I had been particularly impressed that this prize has often been awarded well ahead of recognition elsewhere, and I have held the judgements of the Board of the King Faisal International Prize in very high regard. It is therefore a great honour for me to join this illustrious company and I express my thanks to the Board for having selected me as co-winner of the 2009 prize in Physics.

I am fortunate to be alive at a time when science is seen to be so central to the challenges that society faces and so close to the development of new technologies. The intersection of science, engineering and craft can provide a wonderful playground for ideas and invention. This has been so over the ages, and there have been many brilliant practitioners. More than nine hundred years ago, for example, within the world of Islamic mathematics

and science, the Bana Musa brothers in 9th century Bagdad devised many new machines and devices. Among their surviving designs are the toys described in the 'Book of Artifices', the Kitab Al-Hiyal.

My research has taken me to boundaries between physics and chemistry. I have been interested in the possibility that carbon-based materials might perform similar functions to those of semiconductors such as silicon. Nature, through photosynthesis, uses light to power up life. The molecules that are assembled in green plants function as very sophisticated solar cells that go on to translate the electrical energy first created from light to the chemical energy that allows the plant to grow. I have worked with similar molecules that we have designed to work as the semiconductor in devices such as light-emitting diodes, transistors and solar cells. It was not clear at the outset that these could work at all, but the best way to find out is to do experiments in the laboratory and we were fortunate. Through these measurements we found that we can do far more with these materials than had been anticipated. Indeed this has created a viable manufacturing technology to fabricate large areas of semiconductor devices. One promising application is for use in solar cells, which we know will one day be required on a vast scale to convert sunlight, the only truly abundant form for energy, into electricity. Our materials have the promise to match performance with affordability.

I have steered my science towards the interfaces between the traditional disciplines because this is often where the least is known and where therefore the possibility of new knowledge is highest. However communicating across different sciences is often daunting, because we have to reveal just how ignorant we are outside our own specialty. The rewards are twofold: firstly the discovery that even halting dialog can produce real communication that leads to new knowledge and discovery; and secondly, the appreciation that other approaches to science bring understanding that is of equal value as our own. Communication between scientists across nations and cultures is similarly fertile, generating mutual understanding and reminding each of us that no one view is paramount.

For all these reasons, therefore, I am deeply honoured to have been recognised among so many distinguished international scientists, and I once again would like to thank the Board of the King Faisal International Prize for Science for selecting me as joint winner of the Physics prize in 2009