Prof Hong Ming Hui shared his vision to a capacity crowd at the 10th NUS Engineering Lecture Series, of a world where lasers would be used in a myriad of applications for advanced manufacturing for better life.

Lasers are able to carry data & information at the fastest possible speed. This property would result in many processes being more efficient, accurate, reliable and optimized. This in turn, would result in smarter controls leading to more environmentally friendly & sustainable techniques and finally, higher production. Through this vision, Prof Hong was optimistic that lasers could have a much wider field application when compared to the sensors & systems used today. Examples included futuristic areas like material lattice engineering where perfect heat dissipation materials could be ‘engineered’ for every known application from cell phones to high power generators.

Prof Hong introduced the audience to the concept of ‘smart sensing’. He explained that as the 21st century progresses, there have been an increasing number of calls for an more efficient & reliable method to detect and diagnose a whole plethora of issues ranging from detecting and visualizing cracks in metal pipes & bodies, detecting leakages and diagnosing medical conditions early. He went on to show that his group had not only proven that lasers were a more reliable method in detecting/diagnosing these issues, but had also moved one step further by building prototypes of these detection devices. He also emphasized that these prototypes had already been commercialized through various start-ups that have sprung from his own group proving the value these detection devices have to the industry.

Of particular interest was the use of his Surface Enhanced Raman Spectroscopy (SERS) for the early detection and diagnosis of diabetes. Prof Hong was of the opinion that the use of SERS for diabetic detection would only increase in importance due to prevailing trends of increasing number of diabetics worldwide. He added that diabetes, if detected early, can be reversed and that use of
SERS for mass diagnosis would allow governments to aid their populations in maintaining and lowering the number of potential diabetic cases.

Prof Hong also discussed the various applications of lasers used for modification and manufacturing. In this category of applications, lasers are used to improve materials and enhance their effectiveness. Examples included using lasers for efficient and quick removal of rust while leaving the ‘clean’ metal untouched and using lasers to create nano-scale patterns on the surface of metals to reject water (lowering the chances of the metal rusting).

The potential of lasers for these applications caught the attention of many industry personnel present at the lecture especially those from the marine and offshore engineering companies as rusting on engines, pipes and ship hulls were a common and costly maintenance issue. During the Q&A segment, a majority of questions raised focused on the potential of these applications and the costs that would be involved to bring this technology to market.

Prof Hong concluded by stating that he would be keen to further research through industry collaboration foreseeing enormous potential in the application of laser for material surface modification, and in many other applications for advanced manufacturing.