Department of Materials Science and Engineering Seminar Series 2023

Self-healing materials for optoelectronics

Wan Guanxiang

Date and time: 11 December, 12.30pm

Venue: EA-06-04

Abstract

Self-healing materials can recover from damage – this improves the resilience of fabricated devices and structures, prevents catastrophic failure, and reduces the need for maintenance and replacement of damaged parts. Many classes of materials can be designed to be self-healing, and their applications span diverse fields ranging from construction to electronics. Light is an important medium of communication for both humans and machines, as well as a source of energy; a challenge in self-healing optoelectronics is to develop materials with the requisite optical, electrical, and mechanical properties. In this thesis, the design and application of different self-healing polymers in optoelectronics was explored. First, a high permittivity polymer was enhanced to function as the dielectric of a stretchable and self-healable light-emitting capacitor which achieved high luminance. Second, a hydrogel was formulated to serve as an ionic conductor for a self-healable and magnetically actuatable light-emitting fibre. Third, the stiffness of a transparent polymer was tuned using the oligomers to fabricate optical structures that could self-heal. These structures were applied as a protective light-trapping layer to improve the performance of perovskite solar cells. The works explored in this thesis highlight the potential of self-healing materials in optoelectronic applications.

Biography

Wan Guanxiang received his M.Sc. from NUS and is currently a PhD candidate under the supervision of Associate Professor Benjamin Tee. His research focuses on self-healing

materials and their applications, particularly in the field of optoelectronics, to develop functional and sustainable devices.

Please join us!

HOST: Prof. Ding Jun