Silicon-based light emission technologies based on Si nanoclusters

Huge increases in data transfer rates by integrating photonics and electronics all in silicon

Our group's research focuses on novel ways to generate or manipulate light, using silicon-based photonics to overcome the major current limitations of microelectronics by manipulating photons rather than electrons. Using silicon allows us to integrate photonics and microelectronics, and to exploit existing processing technology and know-how. Most of the components required for silicon photonics exist, but the missing link is a silicon-based optical source. Our work focuses on filling this gap. Silicon is a very inefficient light emitter, thanks to its indirect band gap. This requires us to develop techniques to modify its optical and electronic properties.

The electronic and optical properties of silicon can be engineered by producing size-controlled Si nanoclusters. When these have diameters in the sub-5nm range, they can be made to emit visible light, couple to other emitters to increase the efficiency of, for example, erbium-doped optical amplifiers, or can be used in novel semiconductor memories. We have developed electrically-pumped waveguide optical emitters that generate light at telecoms wavelengths in a silicon-based device, and couple this emission to single mode Si waveguides.

Other technologies that Dr Kenyon is currently working on include:

- Self-assembled nanostructures for photonic, plasmonics and nanoelectronics
- Silicon-based memristors
- Forensic applications of Scanning Probe Microscopy

Dr Kenyon's areas of expertise include:

- Nanostructured materials
- Photonic materials
- Silicon photonics

Applicable to:

- Microelectronics
- Photonics
- Optical Communications
- Nanotechnology
- Sensors

Partner Companies:

- Qinetiq; TEEM Photonics

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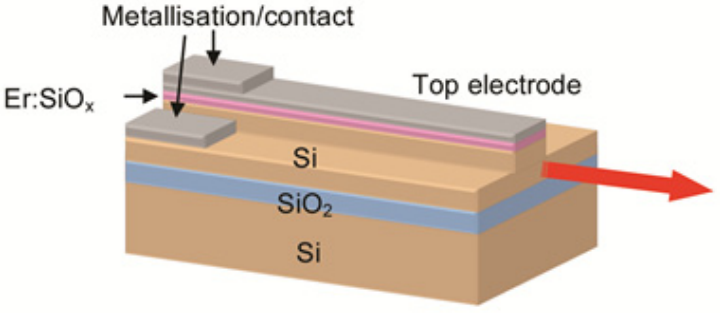

Supported by EPSRC (EP/H000240/1)