Contribution ID: **14** Type: **not specified**

Isotopic fingerprints of gold-containing luminescence centers in 28Si

Wednesday, 18 November 2009 18:00 (20 minutes)

A consequence of a project to grow enriched material for a re-definition of the kilogram, optical spectroscopy on the resulting crystals has revealed many unexpected properties of supposedly well-known (and certainly well-studied) optical centres in Silicon.

It has been shown that a dramatic reduction in linewidth of many deep luminescence centers in highly enriched 28Si can lead to the observation of isotopic fingerprints, revealing not only that a specific element is involved in the defect complex, but also the number of atoms of that element. This work has challenged the accepted picture of many of the most familiar optical centres in Si. A re-interpretation of existing data in terms of a family of four-atom complexes has been proposed for systems comprising Cu, Ag, Au and Li.

Obtaining the isotopic fingerprint of Au is problematic, since only 197Au is stable, but we have now used the relatively long-lived 195Au to reveal the presence, and the number, of Au atoms in several of these centres. We find a series of four-atom centres containing one Au plus Cu and/or Li. Surprisingly, the Au isotopic fingerprint also reveals a series of five-atom centres containing a single Au plus Cu and/or Li. Further evidence for the ubiquity of these four- and five-atom defects is provided by two previously observed Pt-related centres, with luminescence at 884 meV and 777 meV, which are present in these samples due to the decay of 195Au to 195Pt. In addition to Pt, these systems are found to contain three and four Cu atoms, respectively.

Primary author: JOHNSTON, Karl (Universitaet des Saarlandes)

Co-authors: Prof. HENRY, Martin (School of Physical Sciences, Dublin City University, Irelanf); Mr STEGER, Mike (aDepartment of Physics, Simon Fraser University, Burnaby BC V5A 1S6, Canada); Prof. THEWALT, Mike (aDepartment of Physics, Simon Fraser University, Burnaby BC V5A 1S6, Canada)

Presenter: JOHNSTON, Karl (Universitaet des Saarlandes)

Session Classification: Session 4: Technical Progress