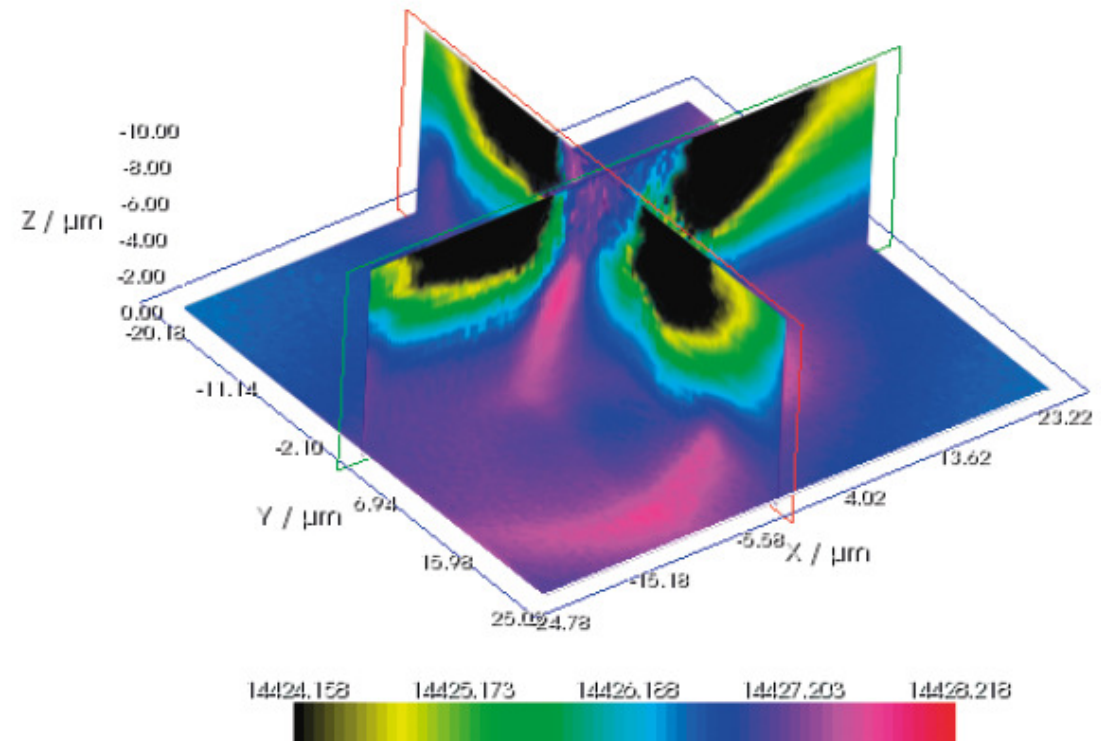


3D Raman imaging

- **3D Raman image of stress within indented ruby**

- Chromium R2 band can be used to reveal stress within the ruby
- Image shows 2 planes perpendicular to the surface and 1 plane parallel to the surface, underneath the indent
- Image reveals stress patterns that help understand deformation and fracture mechanisms

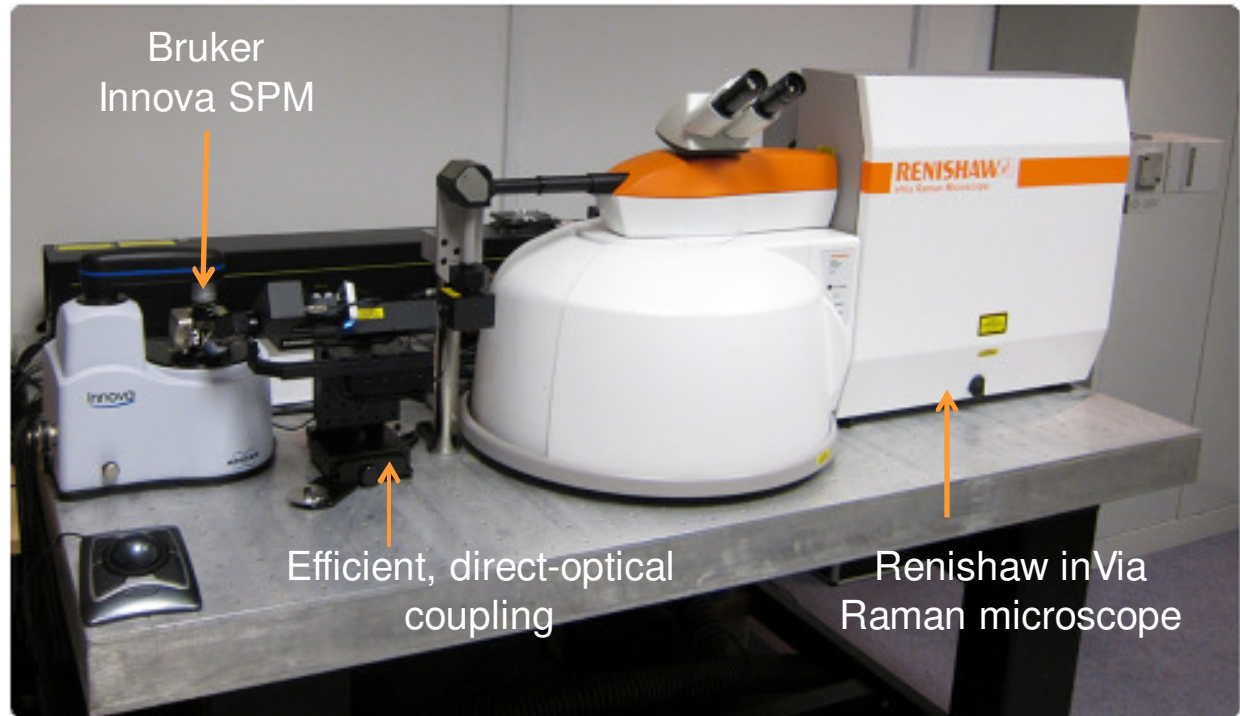


- **Application areas requiring 3D chemical and structural imaging:**

- Biosciences
- Polymers
- Pharmaceuticals
- Materials science
- Geology

Tools for nanotechnology – combined Raman & SPM

- **Co-localised Raman and SPM images**
 - **Chemical image**
 - **Topographic image**
- Other SPM imaging techniques available:
 - Contact mode, tapping mode, phase imaging, NSOM
 - Scanning tunnelling microscopy (STM), magnetic force microscopy (MFM)
 - electrostatic force microscopy (EFM), conductive atomic force microscopy (CAFM), scanning capacitance microscopy (SCM), surface potential microscopy (SPoM), force distance spectroscopy, current voltage spectroscopy, nano-indentation, nanolithography



- **High Z-resolution imaging**
 - SPM tip acts as focusing mechanism on sample surface
 - Improve signal-to-noise at each point due to optimised focal position
- **Tip-enhanced Raman imaging**
 - High resolution chemical imaging
 - <50 nm spatial resolution (best reported ~14 nm)

inVia Raman microscope

- High sensitivity (4th order silicon)
- High spectral resolution ($\sim 0.6\text{cm}^{-1}$)
- High spatial resolution (~ 1 micron)

- Mapping & imaging capabilities
- Variable temperature measurements
- Polarised Raman measurements

- Modular design
 - multiple lasers, filters and gratings
 - fibre probes
 - temperature / environmental cells
 - combined systems (SEM, AFM, NSOM, FTIR)
 - easily upgradeable

- Easy operation
 - automation and proprietary software
 - Non-expert operators can use the instrument with little training

- Rapid results
 - high throughput and high sensitivity = fast results

