

Fast and compact jewellery inspection system capable of identifying the massive number of gemstones at an affordable cost.

Keywords:

- Jewellery, antique, gemstones, jade, inspection, identification, classification, certification, authenticity, analyses, origin
- fluorescence spectroscopy, Raman spectroscopy, 3D imaging, UV, spectrum, point-cloud analysis, fingerprint, database

Problems addressed

- Traditional gemstone inspection relies on gemstone testing laboratories
- Most of the existing tools for testing are bulky and expensive, and not cost-effective for jewellery vendors to set up in the retail shops
- The inspection process usually takes at least a week to complete
- Service charges and labour costs are high

To address the above issues, ASTRI integrated the technologies of **Raman spectroscopy**, **UV fluorescence spectroscopy** and **3D imaging** to build the **Smart Inspection and Identification System** which can identify multiple gemstones at the same time. The compact and concise design analyser also makes it easy for jewellers to perform quick inspection at low cost.

Innovations

The integrated system can identify authenticity, origin of formation, chemical and thermal procedures, and the types of gemstones by comparing the spectrums and analysing outer surface profiles.

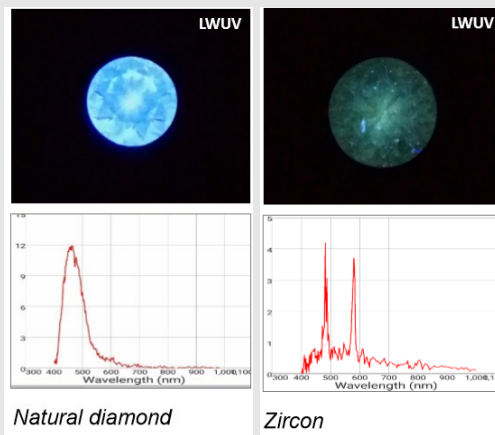
The innovation outlines:

- A **compact fluorescence analyser** is developed to measure the spectrum of the gemstones to differentiate the types of gemstones
- 3D images** in high resolution are captured, and **point-cloud analysis** is used to inspect the surface profiles with 1mm spatial accuracy
- Synthetic** and **simulated** diamonds can be differentiated
- Support wireless connection to view the image on **smartphone**
- Highly portable handheld box** which saves space and is easy to carry
- Built-in database** allows direct comparison and instant authentication
- Simple operations; **single click** to verify the gemstones while updating the database in parallel

Key impact

- A cost-effective way to analyse and identify gemstones with one click
- Short inspection time; supports samples of all sizes
- Non-contact procedures safeguard the completeness of jewellery
- Compact and handy design enabling simple installation

Innovation snapshot



Spectrum comparison

Project completed

- 2020

Applications

- Smart jewellery inspection
- Antique authenticity inspection
- Quality check for manufacturing

Patent(s)

- US App. No. 16/995,931;
- CN App. No. 202080001797.0 and
- HK App. No. 62021030109.4

[ASTRI Patent Search](#)

Commercialisation opportunities

- IP licensing
- Technology co-development