

**Fast and compact size jewellery inspection system capable of identifying massive number of gemstones with affordable cost.**

## Keywords:

- Jewellery; antique; gemstones; jade; inspection; identification; classification; certification; authenticity; analyser; origin
- Raman spectroscopy; Fluorescence 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.**

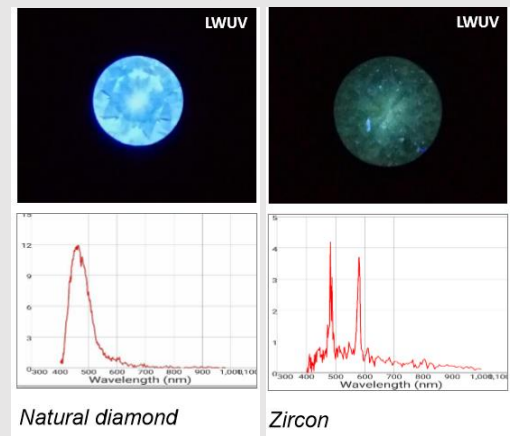
The innovation outlines:

- 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

- 31/03/2020
- 31/03/2018

## Applications

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

## Patent(s)

- Docket number: P0719IoTSEN
- US application No. 16/995931
- CN application No. 202080001797.0
- PCT application No. PCT/CN2020/111721

## Commercialisation opportunities

- IP licensing
- Technology co-development

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