

## Robustness of Klarite<sup>®</sup> gold coating



mesophotonics

### Key Words

- Gold coating
- Acids
- Solvents
- SERS
- Raman

Klarite<sup>®</sup> Surface-Enhanced Raman Scattering (SERS) substrates are highly engineered nano-textured metal surfaces. The robustness of such metal layers is a stringent requirement for many applications. When assessing the applicability and reliability of SERS substrates the resistance of the metal coating to aggressive solvents and high temperatures needs to be considered.

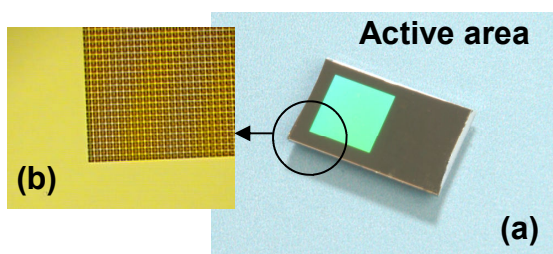


Figure 1 — (a) Klarite chip (b) optical image of active area

In order to test the robustness of the metal coating the Klarite chips were tested with several solutions. Several common solvents, aqueous solutions and aggressive agents were used. The robustness of Klarite to common solvents is shown in table 1 and to aqueous solutions in table 2.

Table 1 — Common solvents and correspondent parameters used in the tests

Substance	Concentration	Temperature	Time
Hexane	pure	20	1 hour
Toluene	pure	20	1 hour
Acetone	pure	20	1 hour
Ethanol	pure	boiling	2 hours
Dimethyl-sulphoxide	pure	70	16 hours

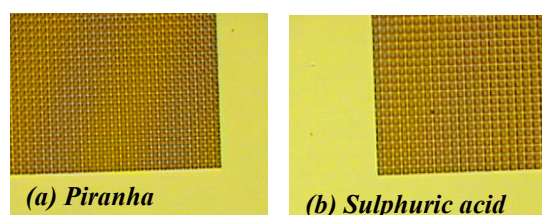


Figure 2 — Appearance of Klarite chip surface after immersion in Piranha (a) and Sulphuric Acid (b)

Table 2 — Various aqueous solutions and correspondent parameters used in the tests

Substance	Concentration	Temperature	Time
Sodium hydroxide	5%	75	1 hour
Ethylenediamine tetraacetic acid tetra-sodium salt	5%	75	1 hour
Hydrogen peroxide	10%	20	1 hour
Potassium hydroxide	2%	70	16 hours
Potassium iodide	2%	70	2 hours
Hydrochloric acid	10%	20	1 hour
Sulphuric acid	98%	20	20 sec
Persulphuric acid "Pirahna"		20	20 sec
Perchloric acid	70%	20	30 sec
Nitric acid	65%	20	2 min
Ethanolic potassium hydroxide	5%	70	2 hours

Despite of the different experimental conditions and degree of chemical harshness the metal coating remained intact for all solutions listed in table 1 and 2. The gold remained well adhered and did not flake, peel or detach in all cases<sup>1</sup>. As an example figure 2 shows the conditions of the gold after immersion in Piranha and Sulphuric Acid.

These results highlight the compatibility of Klarite in many applications that require aggressive solutions and extreme experimental conditions. Klarite metal coating provides a robust surface that is able to tolerate aggressive acids, alkalis and organic solvents.

<sup>1</sup> While the Klarite substrate was not physically damaged by harsh chemicals, the SERS performance will depend on the dissolved analyte.



mesophotonics

Tel: +44 23 8076 3752  
Email: sales@mesophotonics.com  
Web: www.mesophotonics.com