

## 3<sup>rd</sup> International Conference and Exhibition on **Lasers, Optics & Photonics**

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### Identifying disease and monitoring treatment via specific molecules using Raman spectral libraries

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Raman spectroscopy detects individual molecules and is independent of excitation wavelength, using Raman Spectral Libraries and making Raman Spectroscopy a prime candidate for label free sensing and imaging for medical diagnostics at very high specificity and sensitivity (>90%). Raman spectra are very sensitive biochemical markers due to the unique vibrational fingerprint spectra of the tissue. Raman spectroscopy is also very sensitive towards subtle molecular/chemical changes, such as an increased nucleus-to-cytoplasm ratio, disordered chromatin, higher metabolic activity, and changes in lipid and protein levels. We have collected Raman Spectral Libraries for obtaining operator independent diagnostics under ex-vivo and in-vivo conditions and we have tested this approach using multivariate analysis on known solutions with Raman active components. The ultimate successful classification architecture has been formed based on the spectral data multivariate analysis as well as their transformation into prominent features defined as peak location, peak widths and relative peak-peak ratios. This approach is applied for obtaining Raman Spectral Signature for identifying metabolic diseases and anti-cancer chemotherapeutic agents. Emerging technologies such as Surface Enhanced Raman probes will be also discussed.

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### Rock wars, we can win with silicon

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**Problem:** Present day technology does not provide detection and/or deterrence of small to medium size asteroids. Large asteroids can be seen, such as 2014 The Beast, which came close to the earth, but interception and control is not possible. Just as important, detecting this large asteroid three months before flyby was not enough time to deter. Cities could be evacuated, but the global economic damage of losing a city or country would be crippling.

**Solution:** Build a Space Qualified Silicon Space Drone(s) that has only submicron thermal growth, subsecond thermal equilibration low microyield, long term stability, does not creep, does not jitter, is radhard, is economical to build. We can work together globally as the Family of the Earth with each country contributing funds and science as protective brothers and sisters. Successful detection and deterrence can lead to the capture and mining. We can use what could cause harm for good by mining precious minerals. Even possibly building a rock lined road to another inhabitable planet for the future family millions of years down the road. Mankind is fundamentally a species of builders and explorers. Why stop now?

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