spectrally shifted silicon devices for IR imaging & detection

Spectrally shifted silicon devices enhanced by AST's proprietary coatings utilising off-the-shelf CCDs and CMOS packages offer cost effective, high performance solutions to today's infra red (IR) detection and imaging problems.

Background

Conventional silicon devices are predominantly red sensitive with peak sensitivities around 800nm. In order to be more compatible with the sensitivity range of the human eye, it is common for such devices to have this fundamental property of silicon altered by processing to make the devices more sensitive in the green and blue.

However, to make silicon more sensitive to NIR wavelengths, in order to satisfy the wide ranging imaging and detection demands of the market, requires materials reprocessing and expensive electronic design.

The market is therefore dominated by other materials and techniques – primarily InGaAs & streak cameras. Both techniques provide wide ranging performance which is rarely fully utilised in a single application and both techniques are very expensive.

Further, there are performance difficulties with both techniques which can cause problems in some applications. Streak cameras for example suffer from image lag and have limited life-times.

This combination of factors has had the effect of reducing the market uptake of IR applications in the market place.

The AST Solution

Applied Scintillation Technologies (AST) has long experience in developing and manufacturing custom coatings for a wide range of applications.

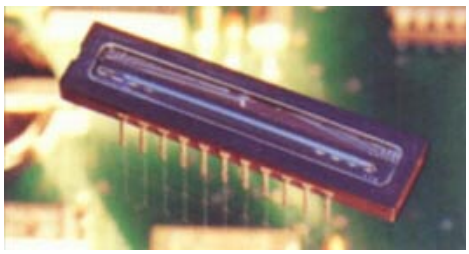
In meeting the demands of developing market requirement AST has developed a range of spectrally shifted silicon devices, the ExtendIR range, to provide application specific, cost effective alternatives to InGaAs, streak cameras and other systems.

The AST ExtendIR range is based on standard off-the-shelf silicon based devices optimally coated with custom phosphors using AST's proprietary deposition techniques.

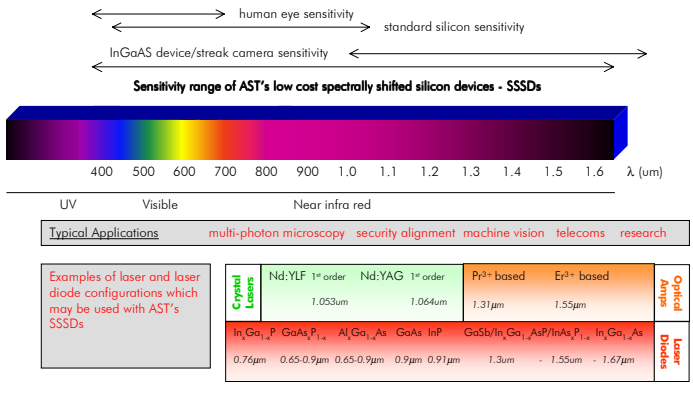
Performance Benefits

As with many of AST's product ranges, performance enhancement is gained by ensuring that the device is designed for the task at hand at a cost-effective price. Thus while conventional InGaAs & streak camera systems offer a general solution in IR, AST ensures maximum, cost effective performance with increased lifetime by utilising the wide range of materials available to them.

Standard SONY ILX511 coated with AST's proprietary materials



infra red applications & market for AST's ExtendIR product range



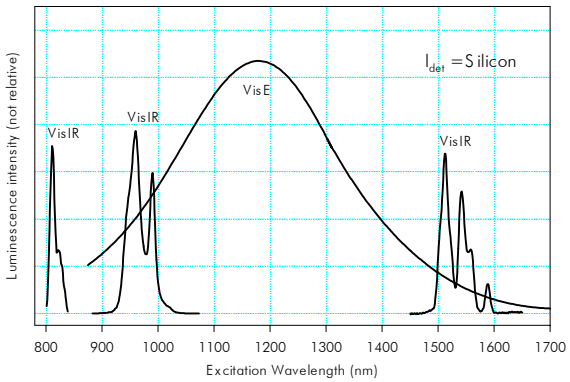
Materials selection parameters

AST has control over a wide variety of parameters in constructing such coatings – principally excitation spectrum, emission spectrum, resolution and noise characteristics and decay parameters.

Applications include laser profiling and alignment, IR spectroscopy (including telecom signal analysis) machine vision and general IR measurement and detection. Standard materials and a summary of characteristics is provided below

material	comment	absorption	emission
♦ VisE	broad band IR requires charging	0.7 - 1.6um	orange
♦ VisIR	band sensitivity non-charge non-fade	0.78 – 0.83um 0.88 – 1.08um 1.5 – 1.6um	green & red + IR (1um)

Absorption spectra of AST's standard IR materials



Device platform

AST's extensive in-house analysis and materials characterisation facilities allow accurate specification of all aspects of materials behaviour. As can be seen by the graphs shown, this includes excitation, emission and efficiency data.

This allows AST to carefully select the material appropriate to the application to give optimised performance with the selected Si device.

AST supplies custom coatings on a range of standard and customer specified devices, examples of which are listed:

photodiodes
Linear CCD arrays — Sony ILX511, Sony ILX526A, Toshiba TCD1021D
2-D CCDs & CMOS devices — Sony ICX024BL
photo multipliers

As can be seen from the absorption spectra shown, AST's customising strategy, proprietary coating techniques on off-the –shelf devices & materials knowledge allows high performance IR imaging & detection in a highly cost effective manner.

Applied Scintillation Technologies has the knowledge and expertise based on years of experience to partner you in the development of custom products cost-effective IR imaging & detection applications using conventional silicon devices.

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Resolution, sensitivity, speed & colour of response are a few of the parameters that can be influenced in the production of a customised product that more closely relates to your customer need.

- A customised product is often a more cost effective solution
- Formulations can be developed to meet your specific requirements
- Exceed your initial expectations through partnership development
- An ISO9002 company – quality assurance is guaranteed through every delivery
- Product differentiation can provide unique product positioning versus competitors
- Enjoy continued product development and technical support through partnership

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