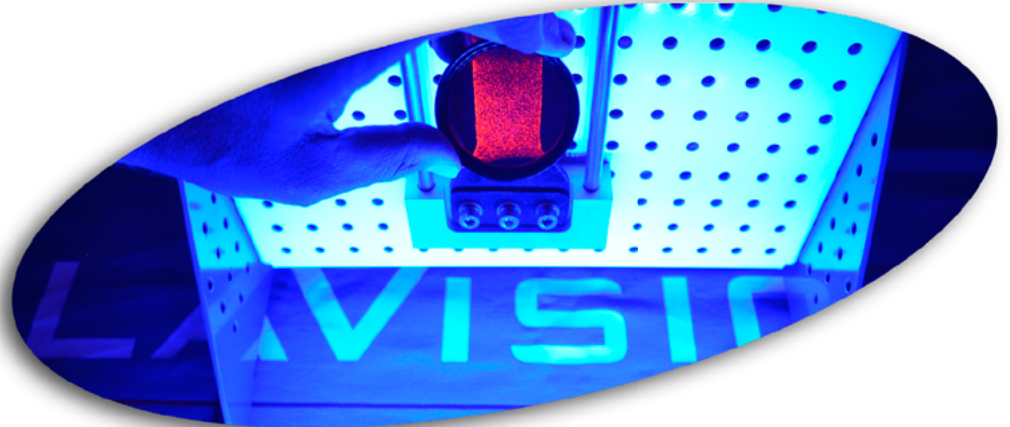


# Photogenic Patterning for DIC Measurements

Speckle patterns  
without base coats

The DIC experimentalist should focus on obtaining high quality images to aid in error minimization as this is where they have the most influence on an experiment. This means that there should be a high quality speckle pattern imaged on the surface of the material. Such a pattern can be said to be photogenic in appearance, especially if that pattern produces its own light emission.



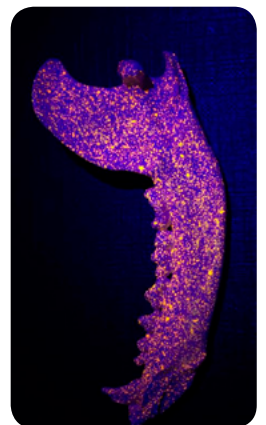
Fluorescence is a means of producing a photogenic pattern. It is the emission of light by a substance that has absorbed light or other electromagnetic radiation. In most cases the emitted light has a longer wavelength than the excitation source (light) and we are therefore able to isolate the fluorescent pattern. This results in some distinct advantages:

- Advantages**
- ▶ no requirement for a solid base coat of paint
  - ▶ high contrast image with consistency in speckle intensity
  - ▶ less susceptible to shadowing effects
  - ▶ no need to tune polarizing filters

**StrainMaster** systems employing fluorescent technology have a wide range of uses, and are highly beneficial in testing across a range of applications and industries.

- Applications**
- ▶ testing of biological tissues where traditional paints will not stick to the surface
  - ▶ composites with shiny surfaces where the interest is in understanding the fracture mechanics of the material rather than the behaviour of the base coat of paint
  - ▶ thin materials where the material properties are affected by the addition of significant paint layers
  - ▶ large strain tests which result in flaking and cracking of traditional paints
  - ▶ deformation of wet materials with time varying specular reflections

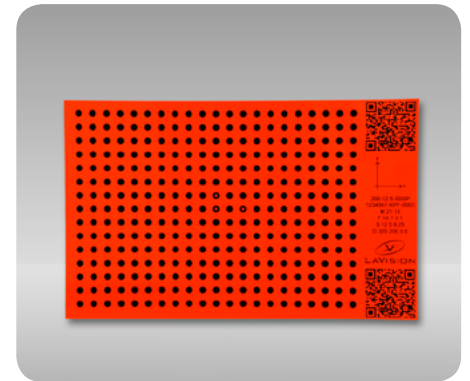
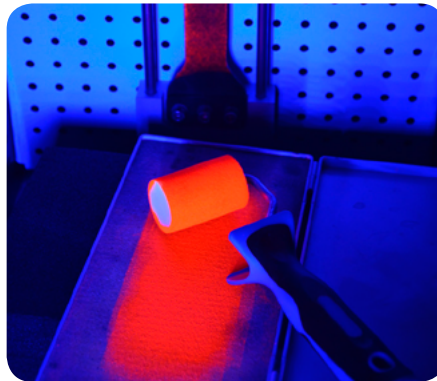
*Courtesy of Jack Tseng,  
Assistant Professor, University of California, Berkeley*



We have been able to draw on our experience across a wide range of techniques where fluorescence and phosphorescence provide the key measurement signal in order to define optimized hardware:

#### Hardware features

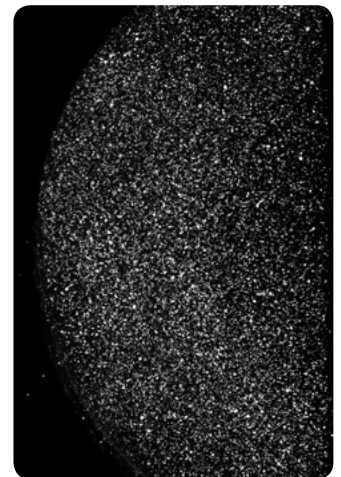
- ▶ narrow band illumination to excite the fluorescent paint
- ▶ filters matched to the paint fluorescent signal
- ▶ speckle pattern toolkit and airbrush system for paint application
- ▶ fluorescent plates for accurate calibration at all scales



LaVision's photogenic DIC solutions lead to improved workflow and efficiency in terms of sample preparation. The benefits of the approach also mean reduced measurement uncertainty and higher quality results.

#### Benefits

- ▶ just apply the fluorescent speckle to the bare material surface without the need for a base coat of paint which needs time to dry
- ▶ no concerns that the base coat will crack and flake from the surface
- ▶ trust that the speckle is faithfully following the underlying material
- ▶ less paint required, and therefore less effect on the underlying material



*Fluorescent speckle on transparent media.  
Courtesy of Rui Liu, Assistant Professor,  
Rochester Institute of Technology*

Data provided by LaVision are believed to be true. However, no responsibility is assumed for possible inaccuracies or omissions. All data are subject to change without notice.

Contact LaVision to learn how we can optimize your DIC measurements and provide photogenic speckle patterns for your application.

Oct-21