CELLO

Advanced

CELLO is short for Solar CELl LOcal characterization. It allows to determine any parameter of solar cell at any given "Point" (= pixels) of a solar cell. It is rather sophisticated. What you do is:

1. Hold the solar cell at some fixed condition with respect to global illumination and either voltage or current as first input.. You then get a defined voltage or current respectively, as an "output" that can be deduced straight from the global characteristics
2. Scan a focussed Laser beam across it, adding a second input. The added illumination at any pixel will "disturb" the solar cell a tiny little bit and the voltage ***V*** or current ***I*** output will be disturbed a little bit by **d*V*** or **d*I*** too. Measure how much the is for every pixel.
3. Use more than 1 Laser (up to 4) with different colors simultaneously. Modulate the intensity with several frequencies at once. Measure the phases of the output signals, too. (Do impedance spectroscopy, in other words)
4. You now get **d*V*'s** or **d*I*'s** sorted by color and frequency (do a FFT to the signals)
5. Produce a complete dynamical (amplitudes and phases) mathematical model for the solar cell. It contains all the desired parameters as unknowns.
6. With at least as much output data as unknowns, solve the equations for the desired parameters and display in some color scheme

- Not simple. And rather demanding wih respect to signal-to-noise, scanning speed, and software. But immensely powerful
- Link to a detailed description of the early system
  Link to a powerpoint presentaion of full system