

# **New Frontiers in Polarized Light Microscopy for Live Cell Imaging**

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Polarization is a basic property of light that is often overlooked, because the human eye is not sensitive to polarization. Therefore, we don't have an intuitive understanding of it and optical phenomena that are based on polarization either elude us or we find them puzzling. Meanwhile, polarized light plays an important role in nature and can be used to manipulate and analyze materials, including living cells, tissues and whole organisms, by observing them with the polarized light microscope.

We created the LC-PolScope, a modern polarized light microscope, by enhancing the traditional microscope with liquid crystal devices, electronic imaging and digital image processing techniques to reveal and measure the alignment of molecules over the whole field of view at once. In recent years we expanded the LC-PolScope technique to include the measurement of polarized fluorescence of GFP and other fluorescent molecules, and applied it to record the remarkable choreography of septin proteins during cell division. We have added the measurement of dichroism and applied it in collaboration with Gus Rosania from the University of Michigan to analyze the sequestration of drug compounds into ordered molecular aggregates inside living cells.

In my presentation, I will reveal some of the magic of polarized light, show how to use it to quantify molecular order and to discover the architectural dynamics inside living cells.

Information and literature available at [OpenPolScope.org](http://OpenPolScope.org)