Tuesday, February 22
1:30 PM – 3:00 PM
Esplanade, Room 157
Chroma Technology

Objective Thinking
Today's off-the-shelf microscopes are technological wonders, capable of imaging in many different modalities across a wide range of objective lenses. But what if your need is more defined? This presentation will introduce you to the openFrame: an imaging platform based on optimizing for specific application(s) around the most important optic in your system: the objective lens.

The presentation will begin by describing a few features that might be better optimized on a custom imager than on a traditional microscope. The openFrame allows complete control of the optical train, enabling fully telecentric designs and the ability to work with optical components from any manufacturer. For example, it is much easier to create a critical illuminator for illuminating large fields, as you are not constricted by the bulk of a traditional microscope frame and have direct access to the objective. Using a critical illuminator with fiber optic can result in 3 times the light intensity at your sample, with a flatter field of view than your standard liquid light guide into a commercial collimator. Perhaps you want to image in two colors simultaneously: you can split the colors in the body of the microscope and greatly reduce the amount of glass each optical pathway encounters. You can go further and select a different tube lens to optimize the resolution onto cameras with smaller pixels, to give a large field of view with a lower price and a more compact footprint. All of these options can be optimized to work with the objective used in your experiment, to capture every last photon and to match resolution and signal-to-noise requirements.

In addition to being more flexible and compact, the openFrame is designed to be long-term sustainable, capable of being maintained and supported by any competent microscopist without reliance on proprietary information or specialist engineers: and future-proof, by maintaining consistent mounting flanges across all modules. Easy end-user alignment of all optical components means there is never a need to return the microscope to base for repair, and any damaged components can be replaced on site.

Prof. Paul French's Photonics Group at Imperial College London have conceived and developed this framework in conjunction with Cairn Research. Dr. Sunil Kumar from the Imperial group is both one of the inventors and an innovator of this platform. He will offer insights into the motivation behind this new, open, platform. He will share with you the results of some of their experiments, including the inexpensive EasySTORM TIRF (using a multimode laser), live quantitative phase imaging, Fluorescence Lifetime Imaging and Optical Projection Tomography. He will also discuss some of their approaches for autofocus, liquid handling and experimental control.

During the talk a pair of technicians will build up an openFrame microscope before your eyes. After Dr. Kumar has shared his results, everyone will have the opportunity to see the system function in a number of modalities; from TIRF to fully automated 2-camera fluorescence with phase contrast.

Speakers
Jeremy Graham, CEO, Cairn Research
Sunil Kumar, Research Associate, Imperial College London