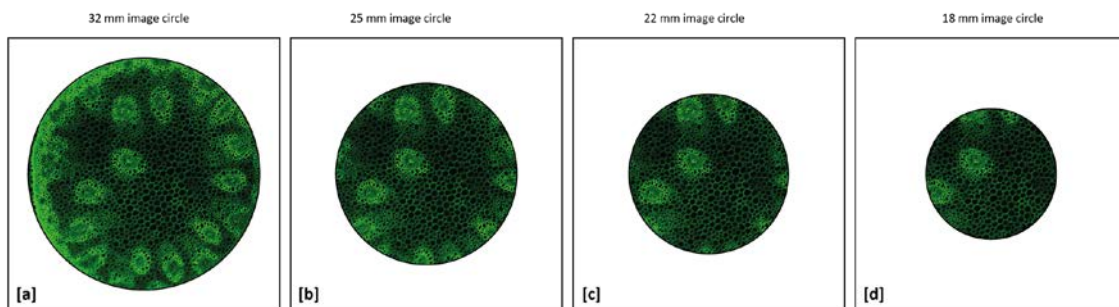


Are Large Image Sensors A Perfect Fit for Large Field Of View Microscope Applications ?

Gerhard Holst*

PCO AG, Donaupark 11, 93309 Kelheim (Germany)

In the last years nearly all microscope manufacturers used image circles with 18 mm diameter to image their field of view to cameras connected to their microscopes. Only recently some microscope manufacturers increased their field of view to offer more information to their customers. However this also resulted in larger image circles to be covered by cameras with their image sensors. Therefore a run for cameras with appropriate image sensors started, and soon large image sensors were advertised, such that the questions arose: are larger image sensors a perfect fit for large field-of-view (FOV) microscope applications. Before this question can be answered, this presentation has a look to the relationship between resolution, magnification, spectral range and pixel size of image sensors.



From [a] – [d]: decreasing diameter of the image circle (field of view) of a microscope image of a convallaria sample, from 32 mm down to 18 mm.

For the answer of the question in the title, it depends, how it is achieved to make a “large” image sensor. If the same amount of pixels is used but having a larger pixel area or pitch, then the advantage of the large field-of-view cannot be exploited. If a “large” image sensor is made of smaller and more pixels, the more information of the larger field-of-view could be efficiently used on cost of a smaller amount of light per pixel. However, if there is enough light available it can be a real improvement and “perfect” fit, since more details can be resolved. The useful application of large pixel image sensors is restricted to large magnification and long wavelength microscope applications.

* e-mail: gerhard.holst@pco.de