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ID-9-P-2869 RAW Image Processing Software

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We developed new software for image processing. This software allows us to control all steps of image formation. Typical starting dataset is the 12 bit raw data image file from the camera chip. The settings of the microscope which driven by the custom software is stored in the EXIF info in the image file (Fig.1).
Image processing starts with removing first 16 columns which used for internal calibration of the noise in the camera. RAW image data are acquired without application of the Bayer mask. This is applied in the next step. The Debayerization process produces images of ¼ resolution (doubles the point width in each axis).
Our RAW data are in 12bit format so for most of processing tools and namely display of image it is necessary to convert them to 8 bits. There are several ways for this conversion. We also developed our method which aims to maximally preserve the information carried in each of the color channels. This algorithm is called LIL (Least Information Loss) (Fig.2). We find out that not all intensity levels in 12bit images are occupied. In this case we find all unique occupied intensity levels in the whole image series, which are then rescaled to 8bit resolution. We know from our experience that non-functional camera elements produce erroneous pixels both at the lowest and at the highest levels. Settings in our software let us to remove specified percentage of the intensity levels from both sides to account for that as well as for additional very rare points in the image.
The remaining settings are connected to the settings of our microscope stored in the EXIF information. When we do the XYZ scan, Sort to Z option allows us to store XY in directories according to Z axis. Option Read and Export tags allows us to export EXIF information to the txt file. Processing of all subfolders allows us to use batch processing of the selected folder. The main correction covers cases when images are taken in wrong position or twice in the same position. Also when the microscope is setup on the limits of the device, there can be some erroneous images. The value Step of Piezo allows us to mark images as relevant or irrelevant and notify correct Z position. Marking of images as relevant or irrelevant is important for further processing, namely image information calculation and processing of 3D image structure.

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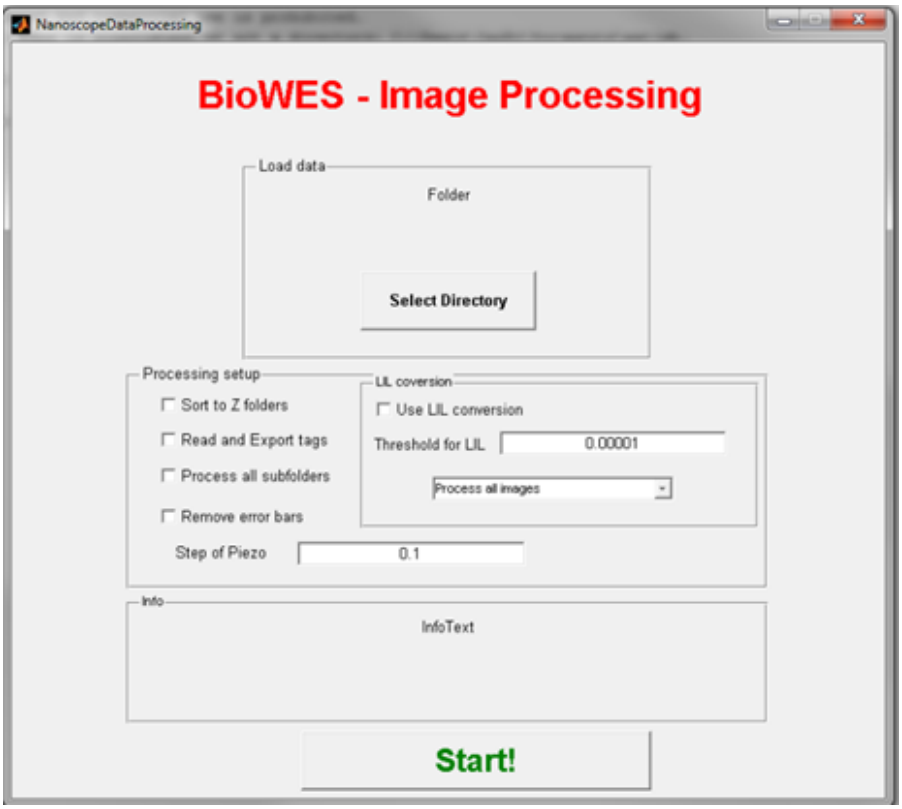

Fig. 1: Fig. 1: Software GUI (Graphical User Interface) – This image shows possible settings of the software

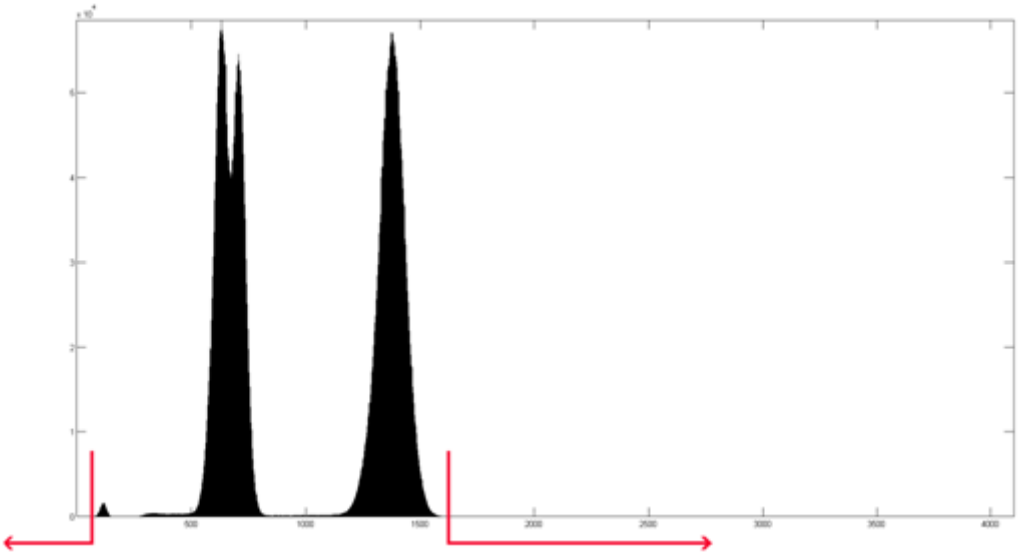

Fig. 2: Fig. 2: Example of histogram – During LIL conversion parts marked by red arrows are removed completely and also all zero levels inside the histogram are deleted. The rest of histogram is converted to 8 bit image.