Analysis and visualization of ferroelectric domain structures by nonlinear confocal microscopy

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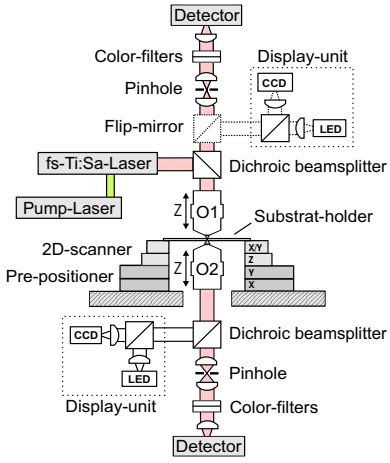
In this work we report on our confocal nonlinear microscopy setup, which allows the depth-resolved analysis of transparent media with detection of the frequency doubled light in forward and backward directions. We present results obtained from differently processed poled lithium niobate specimens.

The development of nonlinear optical methods based on the confocal principle has led to new applications in the field of non-invasive diagnostics and in basic research [1]. For our work in the field of nonlinear microscopy we have designed a modular confocal setup, which is operated with a 20 fs mode-locked TiSa laser source. The frequency doubled light is collected in reflection and/or transmission geometry and detected by single photon counting modules. Image acquisition is accomplished by scanning the sample by nano-positioners under the condition of a spatially fixed laser focus. A complex system of positioning-units (3D-scanner, Pre-positioner) allows inspection areas up to 5" x 5" in size. With this setup we have performed systematic investigations of poled lithium niobate with tomographic visualization of the ferroelectric domain structures [2].



Schematic of our confocal nonlinear microscope setup.

References

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