

High Speed High Resolution Structured Illumination Confocal Microscope with Using the Cross-type Line Structured Illumination

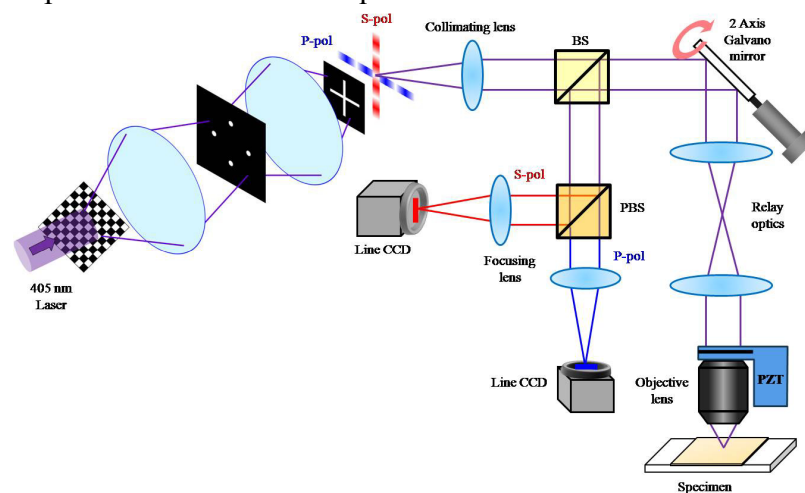
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Inspired by water-repellent behavior of the biological surfaces, superhydrophobic structures have received a lot of attention by researchers [1]. In order to manufacture superhydrophobic surfaces with a wide area and a low cost, it is necessary to have a high speed high resolution optical system that can measure nano structures which have a dimension of 80 nm non-invasively in real-time. We propose the high speed high resolution structured illumination confocal microscope that satisfies those requirements.



Sinusoidal patterns should be illuminated on the specimen and rotated and phase-shifted to achieve the structured illumination microscope. From a sequence of images with three orientations and three phases of the pattern, it is possible to recover information with twice the normal resolution [2]. The structured illumination confocal microscope can simply be implemented by use of structured illumination-generating optics with conventional slit-scanning confocal microscopy [3]. We consider that the specimens have no directionality because the nano structures for manufacturing superhydrophobic surfaces have a circular symmetry. Therefore, we only illuminate two perpendicular line sinusoidal patterns on the specimen. We generate the cross-type line sinusoidal patterns by using two-dimensional diffractive grating and four cylindrical lenses. We can acquire images fast by applying two-axes galvano mirrors and two high speed line CCD camera.

References

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