AUTOMATED MICROSCOPY SYSTEM FOR SINGLE MOLECULAR SPECTROSCOPY MEASUREMENTS

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Although Scanning Probe Microscopy techniques and conventional spectroscopy methods have been very successful in analyzing polymeric materials in bulk, the fundamental properties are usually masked by the degree of disorder in thin films. When a material is studied at the single molecule level, its properties are drastically different. In order to study these phenomena, a new method has emerged in recent years: single molecular spectroscopy, relying on measuring the fluorescence spectra of single polymer chains isolated and immobilized in a matrix (such as Polystyrene or Zeonex) [1-3].

For fluorescence and SMS experiments we are using a custom built optical microscope based on Zeiss optics, equipped with an Acton 150 spectrometer an a ProEM 512 electron-multiplying charged couple device camera and a Thorlabs M470L2 LED source for molecule excitation. Sample position is being controlled through a series of Thorlabs TDC001 DC servo motors.

The optical measurements required for Single Molecular Spectroscopy (SMS) can, at times, be very slow and time consuming due to the manual operation of the experimental set-up. In order to automate the experimental procedure, and allow real-time SMS measurements, we have developed and implemented a fully automated measurement system, for the purpose of optimizing the optical measurements with minimal user intervention.

References: