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**INSTRUMENT AND SOFTWARE DEVELOPMENT FOR
MEASURING SIZE OF NANOPARTICLES USING
DYNAMIC LIGHT SCATTERING**

A PROJECT REPORT PRESENTED BY

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✓

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POSTGRADUATE INSTITUTION OF SCIENCE

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for the award of the degree of*

MASTER OF SCIENCE IN NANOSCIENCE AND NANOTECHNOLOGY

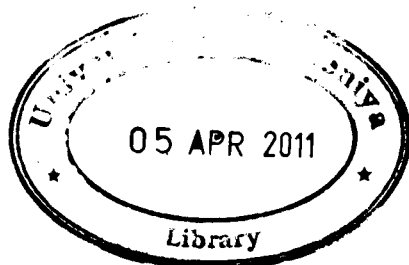
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INSTRUMENT AND SOFTWARE DEVELOPMENT FOR MEASURING SIZE OF NANOPARTICLES USING DYNAMIC LIGHT SCATTERING

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Dynamic Light Scattering is a technique was used to measure the size of colloidal particles. The main objectives of my research were to develop an experimental setup for Dynamic Light Scattering, developing software for data processing, evaluation of the particle size and check the reliability of the developed experimental set up and data processing method.

According to the objectives the experimental setup was developed in which a laser beam passes through the sample. Then fluctuations of light intensity arise due to the Brownian motion of colloidal particles. The scattered light was detected by the photomultiplier tube at a scattered angle of 90° . The photomultiplier tube's analog signal was then converted into a digital signal by using an analog to digital converter. Then the digitized data was collected from the computer using the software purposely developed, and the autocorrelation coefficient was calculated.

The graph of autocorrelation coefficient was plotted against time. The value of diffusion coefficient was calculated by fitting the Siegert equation to the graph of autocorrelation coefficient against time. Finally the particle size was calculated from the Stokes- Einstein equation assuming spherical shape particles. The instrument has been calibrated by measuring the particle sizes of Degussa TiO₂ P25 sample (25.1 ± 0.8 nm). The mathematical treatment was used to determine the particle sizes of different particles. This method offers a cost effective technology to determine particle size at nanoscale. However the particle size measures considering the particle shape also.