

TABLE OF CONTENTS

| | | |
|-----|--|----|
| 1 | Introduction | 5 |
| 2 | Scanning Probe Microscope - design and operation | 5 |
| 2.1 | Principles of the operation | 5 |
| 2.2 | Design of the microscope | 6 |
| 2.3 | New optical detection unit | 7 |
| 2.4 | Calibration of the piezosscanner | 9 |
| 2.5 | Atomic resolution with STM..... | 10 |
| 3 | AFM studies of surfaces under atmospheric conditions | 11 |
| 3.1 | Surface roughness measurements..... | 11 |
| 3.2 | Etching of microstructures | 12 |
| 4 | Application of AFM in Fabrication of Micro/Nanostructures | 13 |
| 4.1 | Instrumentation and sample preparation..... | 14 |
| 4.2 | Results and Discussion..... | 14 |
| 5 | Investigations of Si(111) surfaces by high temperature UHV STM | 17 |
| 5.1 | Instrumentation | 17 |
| 5.2 | Hot STM Temperature Controller..... | 17 |
| 5.3 | Tip-induced nanostructures on Si(111) 7×7 surface | 19 |
| 6 | Development of the secondary electron detector for low vacuum scanning electron microscopy | 22 |
| 6.1 | Principles of the detector operation | 23 |
| 6.2 | Detector performance tests..... | 25 |
| 6.3 | Results | 26 |
| 7 | Conclusions | 27 |
| 8 | References | 28 |
| | Author's Curriculum Vitae | 30 |
| | Abstrakt..... | 31 |