

# Specifications for Three-Dimensional Serial Sectioning System

## 1.0 Three-Dimensional Serial Sectioning System

### System Components

The system shall include:

- 1.1 A metallographic optical microscope w/ sample motorized stage and integrated microhardness indenter
- 1.2 A digital microscopy camera with software for camera control, acquisition and storage of images, sample stage control
- 1.3 A control computer for the microscope
- 1.4 A external standalone micro-hardness indenter
- 1.5 Two semi-automated micropolishers

### 1.1 Metallographic Optical Microscope

- 1.1.1 The microscope must be an inverted optical materials microscope
- 1.1.2 Integrated motorized sample stage with metallographic sample holder that has:
  - a.) Minimum step size of 0.05 microns or less
  - b.) Repeatability of 0.3 microns or less
- 1.1.3 Integrated microhardness indenter
  - a.) Both Vickers and Knopp indenters (not necessarily simultaneously)
  - b.) Position indent within 1micron of specified location through optical objective.
- 1.1.4 Filters and Imaging techniques should include bright field, dark field, Nemarski, DIC w/ linear polarized light and circular polarized light
- 1.1.5 Must include objectives for total magnifications including (or comparable) 1600x, 1250x, 1000x, 800x 500x, 160x, 100x, 50x
- 1.1.6 Integrated z-axis focus motor, 25nm minimum step size or less
- 1.1.7 All objectives must be plan-Fluorite corrected

### 1.2 Digital Microscopy Camera and Associated Software

- 1.2.1 At least 5 mega pixel sensor
- 1.2.2 Software that will:
  - a.) Control all camera functions
  - b.) Integrate with z-axis focus motor on metallographic microscope
  - c.) Integrate with motorized sample stage on metallographic microscope
  - d.) Collect automatic montage images and stitch them together with minimal user intervention
  - e.) Control micro-hardness indenter
- 1.2.3 Real-time viewing with at least 20fps
- 1.2.4 Electronic Shutter

### 1.3 Computer

- 1.3.1 Operating system compatible with camera software
- 1.3.2 Pentium 4, 3.0Ghz or equivalent
- 1.3.3 At least 200GB harddrive
- 1.3.4 At least 2.0 GB RAM
- 1.3.5 6 Pin Firewire (IEEE 1394) and USB2.0
- 1.3.6 20inch LCD display
- 1.3.7 Video Card with at least 256MB

#### 1.4 Standalone Microhardness Indenter

- 1.4.1 Position indent within 1micron of specified location through optical objective.
- 1.4.2 Both Vickers and Knopp hardness indenters
- 1.4.3 Dwell time 5-40 seconds
- 1.4.4 Two objectives: 10x, 20x
- 1.4.5 Automatic turret
- 1.4.6 Digital readout of XY position (optional requirement)

#### 1.5 Semi-Automated Micropolishers – Two identical units needed for two stage polishing

- 1.5.1 User defined polishing pressure
- 1.5.2 User defined polishing speed
- 1.5.3 Polishing accomplished by sample vibration.
- 1.5.4 Compatible with 1'' and 1.25'' diameter standard metallographic samples
- 1.5.5 Capable of using a variety of polishing pads and polishing media