Pure Nickel

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Purpose:

The purpose of this application guide is to prepare and examine the micro–structure of pure nickel.The pure nickel sample is prepared by sectioning (CT 250S manual cutting machine), hot mounting (FlexPress automatic mounting machine), and grinding and polishing using the Alpha 610 auto–matic grinding and polishing machine After surface preparation, the speci–men is etched with Marble's reagent to reveal the microstructure, which is subsequently examined under an optical microscope.

Recommended Equipment and Consumables (Grinding and polishing consumables should be selected according to the actual sample condition.)



CT 250S manual cutting machine

Force Recommendation by Specimen Size				
Sample size/ diameter (mm)	25	30	40	50
Individual loading mode, Force per Specimen (N)	–5	0	+(5~10)	+(5~10)

*Based on a standard specimen diameter of Ø30 mm, the applied force should beadjusted according to the actual specimen size.

Cutting

Equipment	CT 250S manual cutting machine	
Cutting disc	S20 Abrasive Cut Off Wheels	Order No: 01.02.450
Cutting coolant	TJ 1410 cutting coolant	Order No: 01.07.857
Fixture	Fast and quick clamping	
Cutting method	Vertical cutting	
Cutting parameters	Feeding speed	Manual
	Speed	2800rpm

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FlexPRESS Mounting Press

Hot mounting

Equipment	FlexPRESS Mounting Press	
Hot mounting resin	PT 2231 Universal Hot Mounting Resin	Order No：02.01.310
Heating power	100%	
Holding time	4min	
Temperature	160℃	
Pressure	150bar	
Target Temperature	Cool down to 30 ˚C	
Cooling rate	Fast	
Top Heating	Enabled	

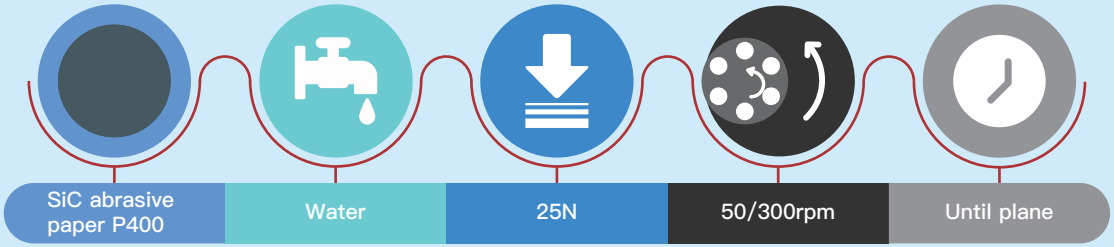
Basic Preparation Guide

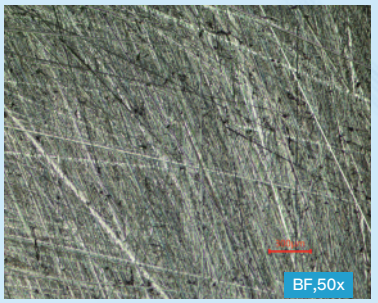
- **Cutting** 1.Select an S20 silicon carbide (SiC) cutting wheel for sectioning.The specific wheel specification should be selected according to the Trojan Cutting Guide.
- **Mounting** To allow observation of the internal microstructure, a general–purpose hot mounting compound is recommended.
- **Grinding** 1.Perform coarse grinding using P400 SiC paper / grinding disc until the specimen surface is flat and the cutting damage layer is completely removed.
  2.After coarse grinding, continue grinding using a POS disc incombination with 9μm diamond suspension.
  3.After each grinding step, thoroughly rinse and clean both the specimenand the specimen holder with water to prevent cross–contamination.
- **Polishing** 1.Before starting polishing, the polishing cloth, specimen holder, and hands must betho–roughly cleaned. This cleaning procedure shall be repeated after each subsequentpolishing step.
  2.Polishing discs used with different diamond particle sizes must not be mixed to avoid cross–contamination.
  3.After polishing, rinse the specimen with alcohol and dry the surface using a blower to remove anyresidual water stains.
  4.After each polishing step, examine the specimen under a metallurgical microscope to verify that thescratch size corresponds to the polishing particle size and that the scratch pattern is randomly oriented.
  5.If residual scratches are still visible after SC polishing, the polishing time may be extended by 3—5minutes.
  6.After use, polishing cloths should be thoroughly cleaned with running water and a soft brush,drained, and stored properly.

Preparation Procedure——Pure Nickel

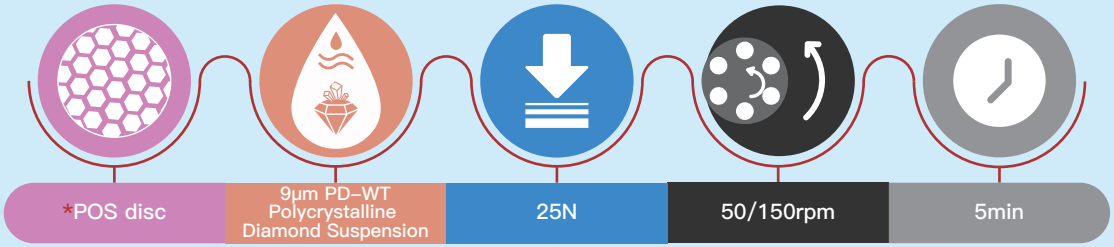
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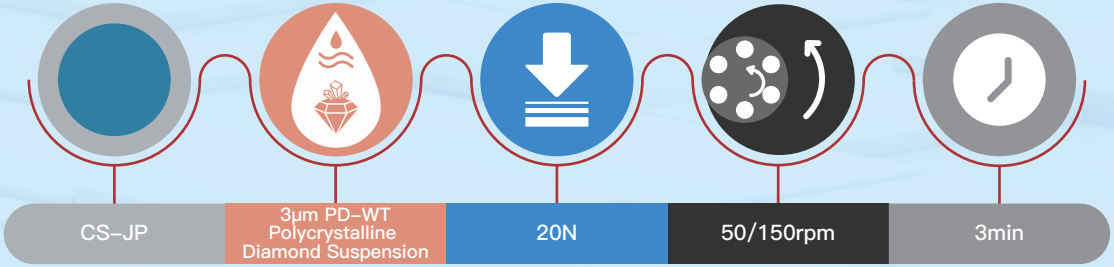
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*The POS disc may be replaced with P800, P1200, or P2500 SiC paper, depending on the sample condition.

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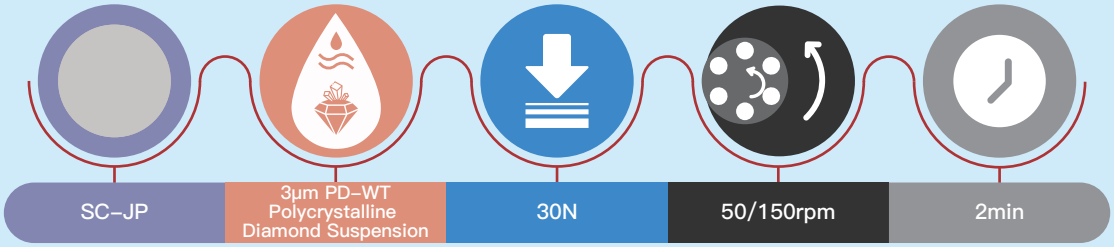


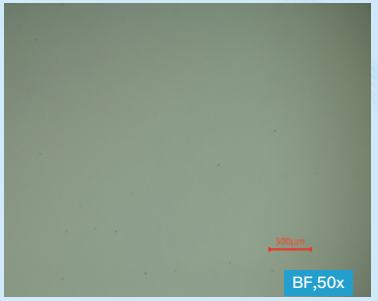


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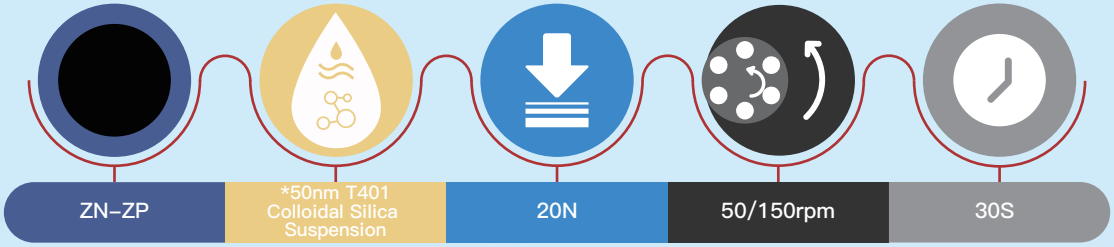
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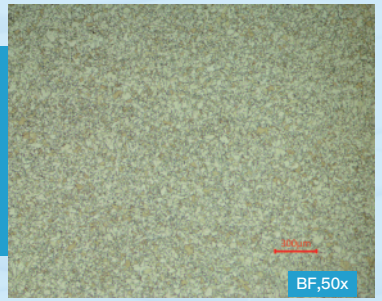
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*The colloidal silica suspension may be modified by adding ammonia solution and hydrogen peroxide with the following ratio:1mL ammonia solution + 1mL hydrogen peroxide +48mL colloidal silica suspension.

The specimen is etched using a ferric chloride—hydrochloric acid aqueous solution prepared with 5 g ferric chloride, 10mL hydrochloric acid, and 100 mL water. The recommended etching time is 10—20 seconds.



Polishing Quality Examples – Pure Nickel

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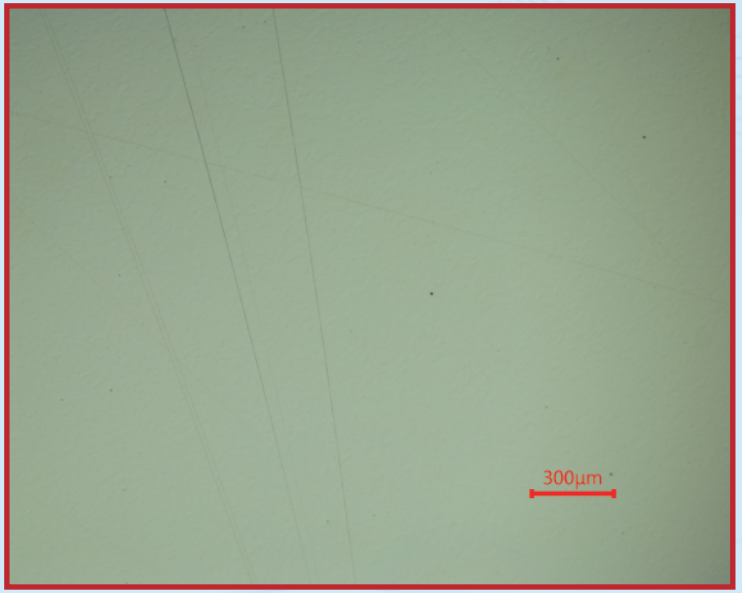
Acceptable Polishing Result



ZN polishing cloth + 50 nm colloidal silica suspension–50X

- The specimen surface is clean and free of scratches.

Unacceptable Polishing Result



ZN polishing cloth + 50 nm colloidal silica suspension–50X

- The specimen surface is not properly cleaned andexhibits residual scratches. The colloidal silica polishing suspension was used without ammonia solution and hydrogen peroxide, resulting in insufficient chemical—mechanical polishing action;
- Re–polish the specimen and then re–etch. If the etchedlayer is relatively deep, perform re–grinding followed by polishing before etch–ing again