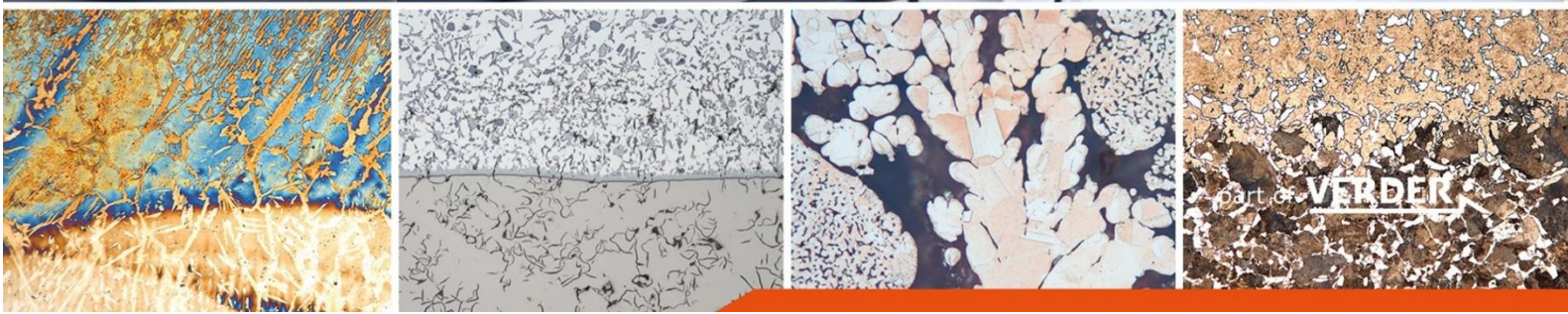


Application lab. report

Mineral, ceramic and AlN component

Preparation for SEM analyze



QATM-Preparation method

Objective:

The mineral, ceramic and AlN component Samples should be metallographically prepared for SEM analyze.

The cutting and mounting has not been done in this preparation. The parameters are just a suggestion from QATM experts.

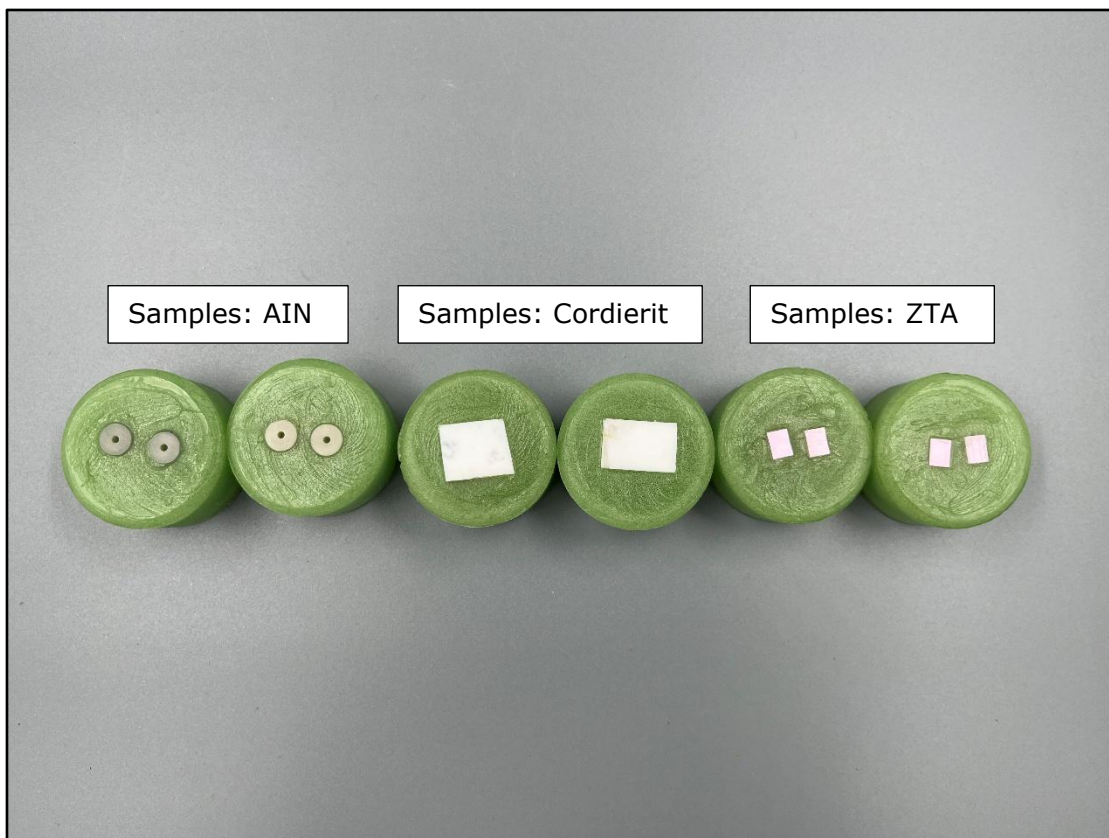


Figure 1. As-received samples

QATM-Preparation method

Cutting

		Cutting	
Device	Cut-off disc	Anti-corrosion coolant	Clamping tool
Qcut 200 A	Diamond cut-off disc ø 150 mm	ATM Cool Cut	-Easy-clamping late S -Qtool 40 S
Cutting method			
Automatic horizontal cutting method (with X-axis)			
Parameters			
Feed speed	Pulse parameter	Cut-off disc rotational speed	
< 0,1 mm/s	Without pulse	2500 - 3000 RPM	
Notes			

Cold mounting

 Mounting				
Consumable	Mixing ratio Volume	Curing time	Mold	Additional equip.
KEM 20	Powder : Liquide 2 : 1	15 Minutes	Qmould Clear, ø 40 mm	- Qprep Pressure Unit
Notes				
- please use mounting moulds which do not have a chamfer!				

QATM-Preparation method

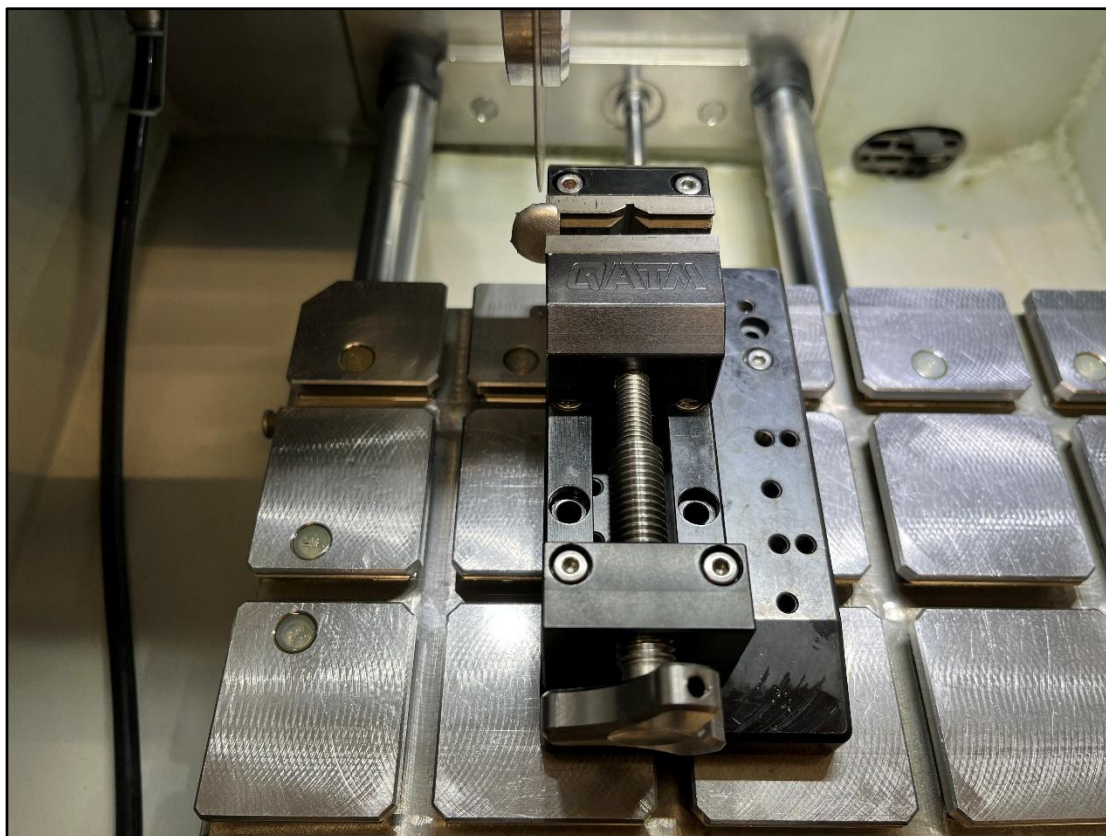


Figure 2. Clamping overview of the sample (example)



Figure 3. Overview of Coorstek-sample. The sample has a chamfer.
The chamfer causes problems during sample leveling for the Qpol VIBRO.

QATM-Preparation method – AIN and ZTA

Grinding/Polishing

Device	Samples holder	Pressure mode				
QPOL 250 A1 Eco	Z5442024 or Z5445025	Single				
Step	MEDIUM		 RPM		 N	 min
 Grinding	VEGA 54 µm	H ₂ O	200	100 ▶▶	25	5:00
 Grinding	VEGA 25 µm	H ₂ O	200	100 ▶▶	20	5:00
 Pre-Polishing	BETA	Diamond susp. 9 µm	150	100 ▶▶	30	8:00
 Polishing	GAMMA	Diamond susp. 3 µm	150	100 ▶▶	30	5:00
 Polishing	GAMMA	Diamond susp. 1 µm	150	100 ▶▶	30	5:00
 Etching (chem.)	Etchant -					-

Notes

- Pre-dosing for 9 µm, 3 µm und 1 µm: 3-5 s
Dosing interval and dosing duration for diamond susp. 9 µm, 3 µm, 1 µm:
Every 35 s for 1,5 s

QATM-Preparation method – Cordierit

Grinding/Polishing

Device	Samples holder	Pressure mode				
QPOL 250 A1 Eco	Z5442024 or Z5445025	Single				
Step	MEDIUM		 RPM	 N	 min	
 Grinding	VEGA 54 µm	H ₂ O	200	100 ▶▶	25	5:00
 Grinding	VEGA 25 µm	H ₂ O	200	100 ▶▶	20	5:00
 Pre-Polishing	BETA	Diamond susp. 9 µm	150	100 ▶▶	30	10:00
 Polishing	GAMMA	Diamond susp. 3 µm	150	100 ▶▶	30	5:00
 Fine polishing	GAMMA	Diamond susp. 1 µm	150	100 ▶▶	30	5:00
 Etching (chem.)	Etchant -				-	

Notes

- Pre-dosing for 9 µm, 3 µm und 1 µm: 3-5 s
Dosing interval and dosing duration for diamond susp. 9 µm, 3 µm, 1 µm:
Every 35 s for 1,5 s

QATM-Preparation method

Vibration polishing

Device	Sample holder	Weight		
QPOL VIBRO	Z5651011	3 x		
Step	MEDIUM		Frequency (Hz)	 h
 Vibration-Polishing	ZETA	Eposil F 0,1 µm	90	2 - 4
Notes	- In addition to the frequency of 90 Hz, an intensity of 80 % should be set			



Figure 4. Overview of the Qpol Vibro

QATM-Preparation method - AIN

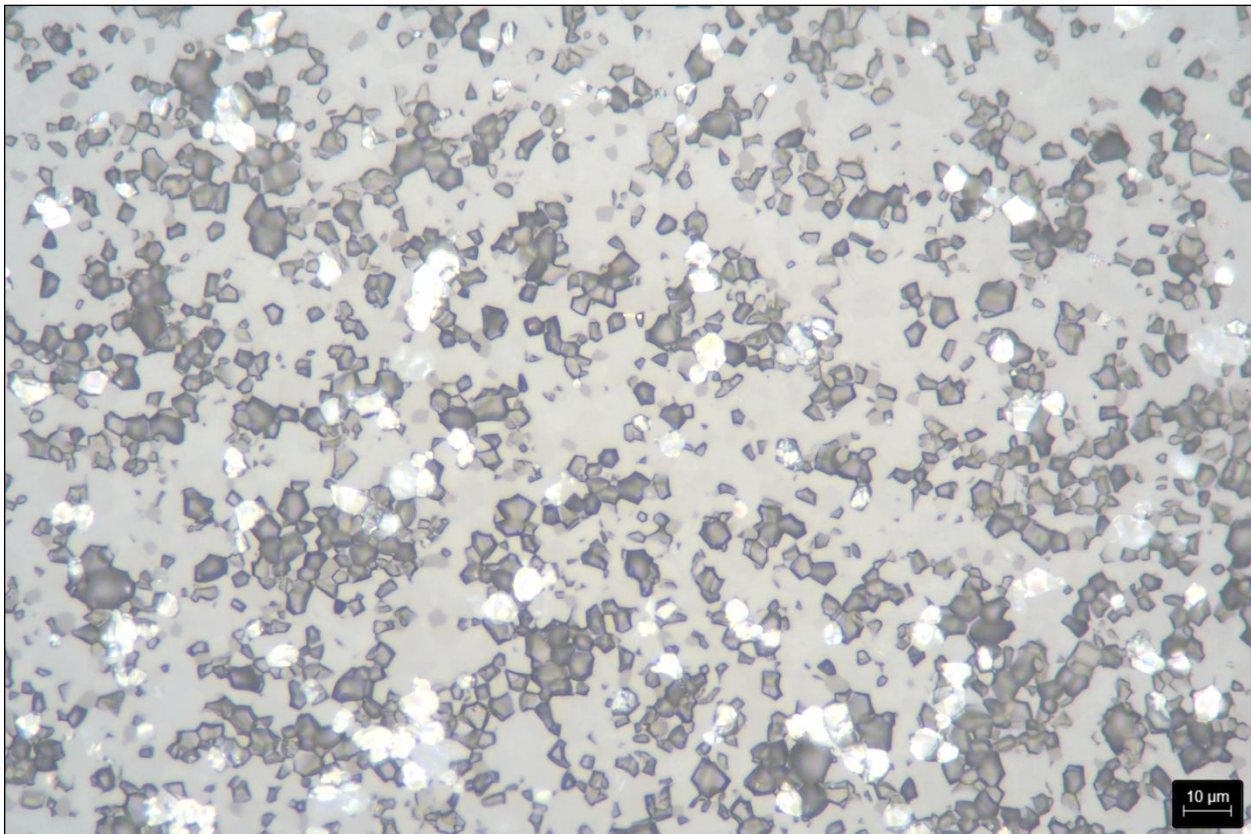


Figure 5. Sample AIN after preparation with Qpol 250 A1 Eco – core area - 500:1

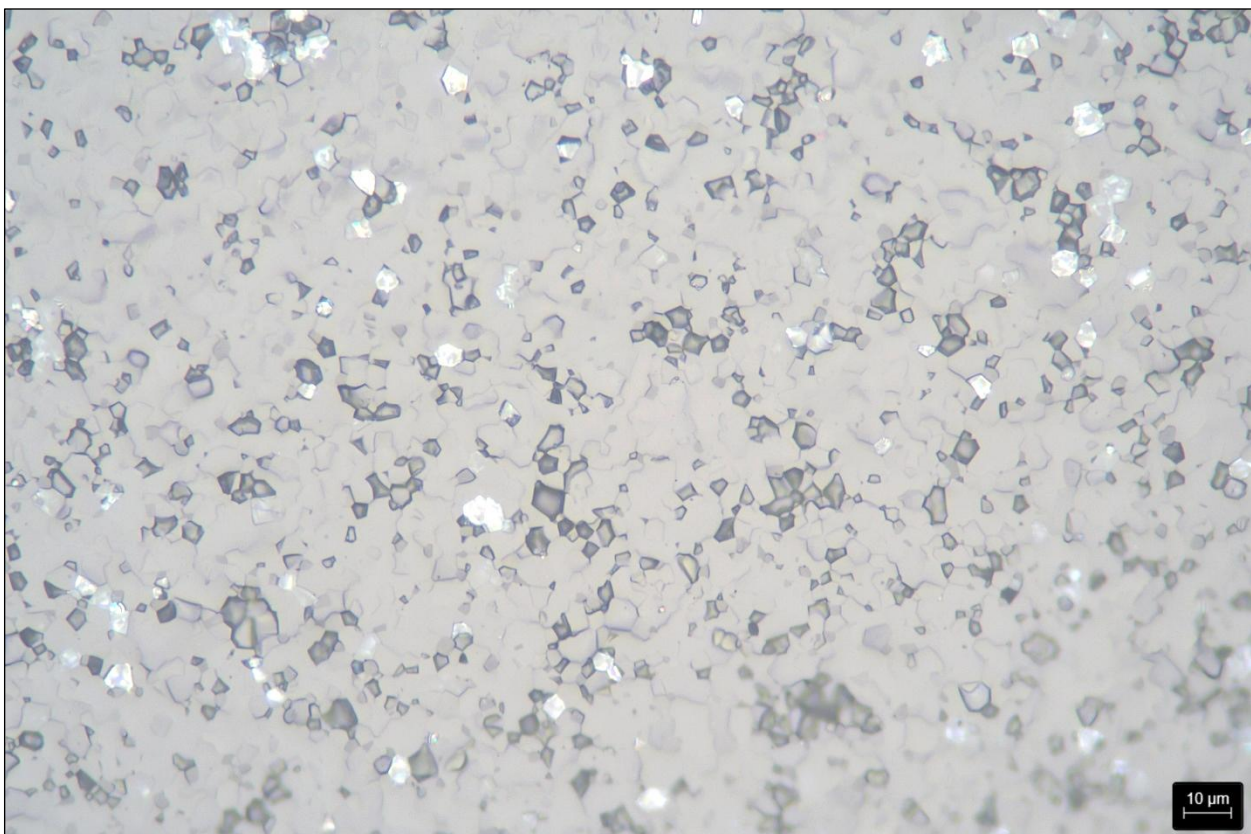


Figure 6. Sample AIN after preparation with Qpol 250 A1 Eco + Qpol Vibro (2h)
core area - 500:1

QATM-Preparation method - ZTA

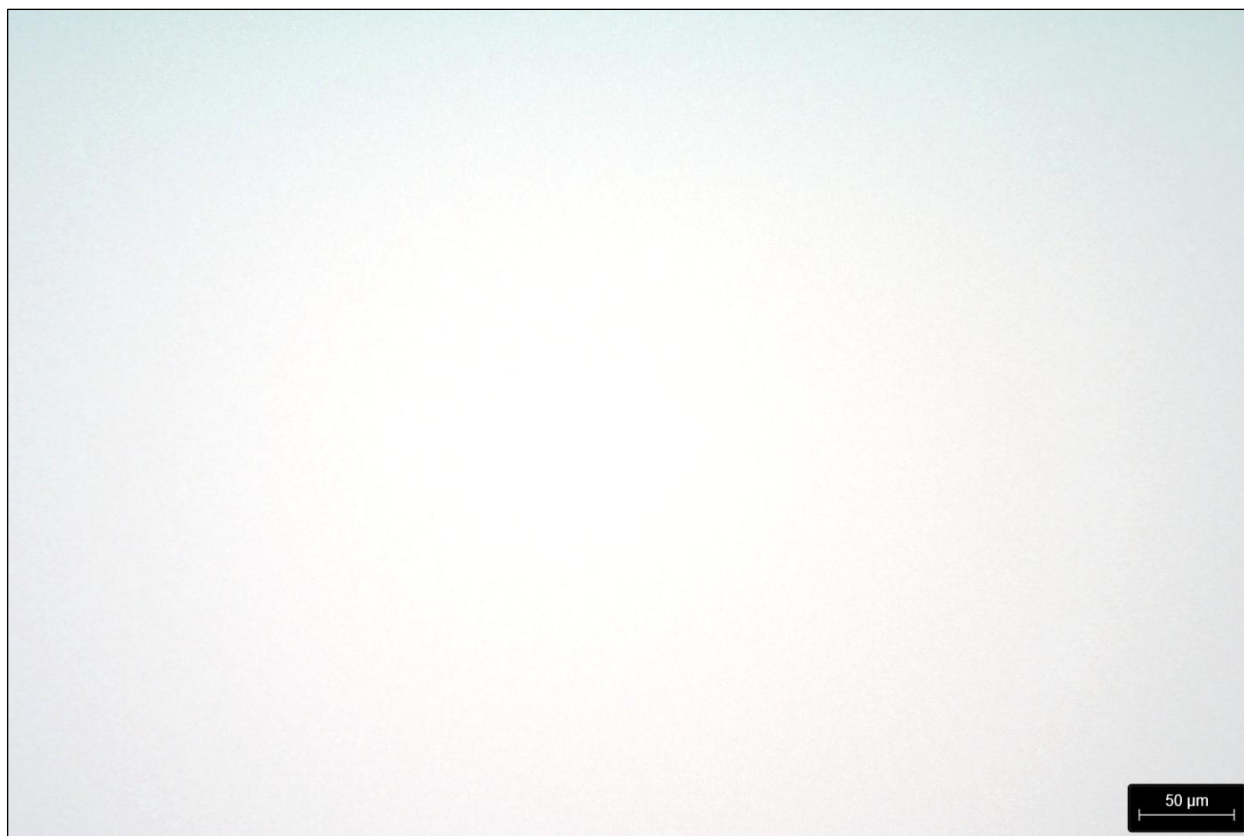


Figure 7. Sample ZTA after preparation with Qpol 250 A1 Eco – core area - 500:1

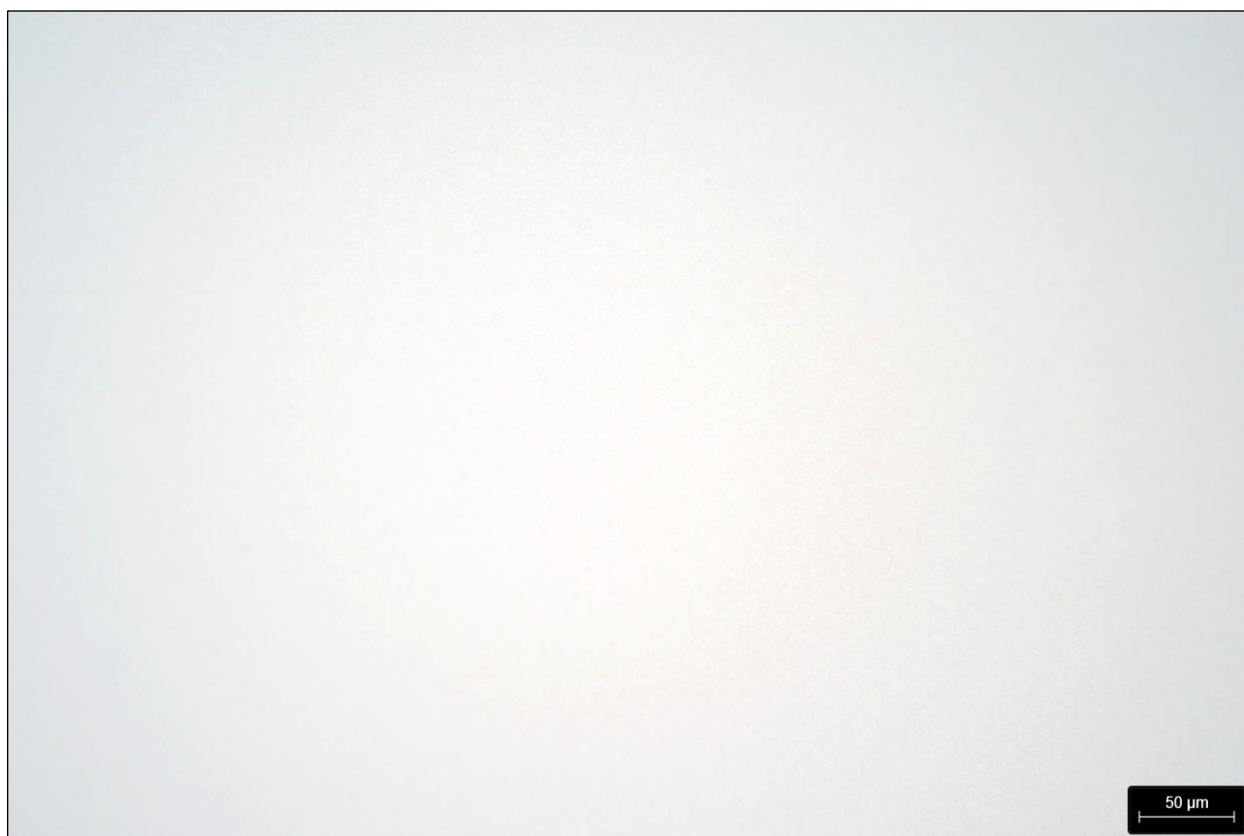


Figure 8. Sample ZTA after preparation with Qpol 250 A1 Eco + Qpol Vibro (2h)
core area - 500:1

QATM-Preparation method - Corderiet



Figure 9. Sample Corderiet after preparation with Qpol 250 A1 Eco – edge area - 100:1

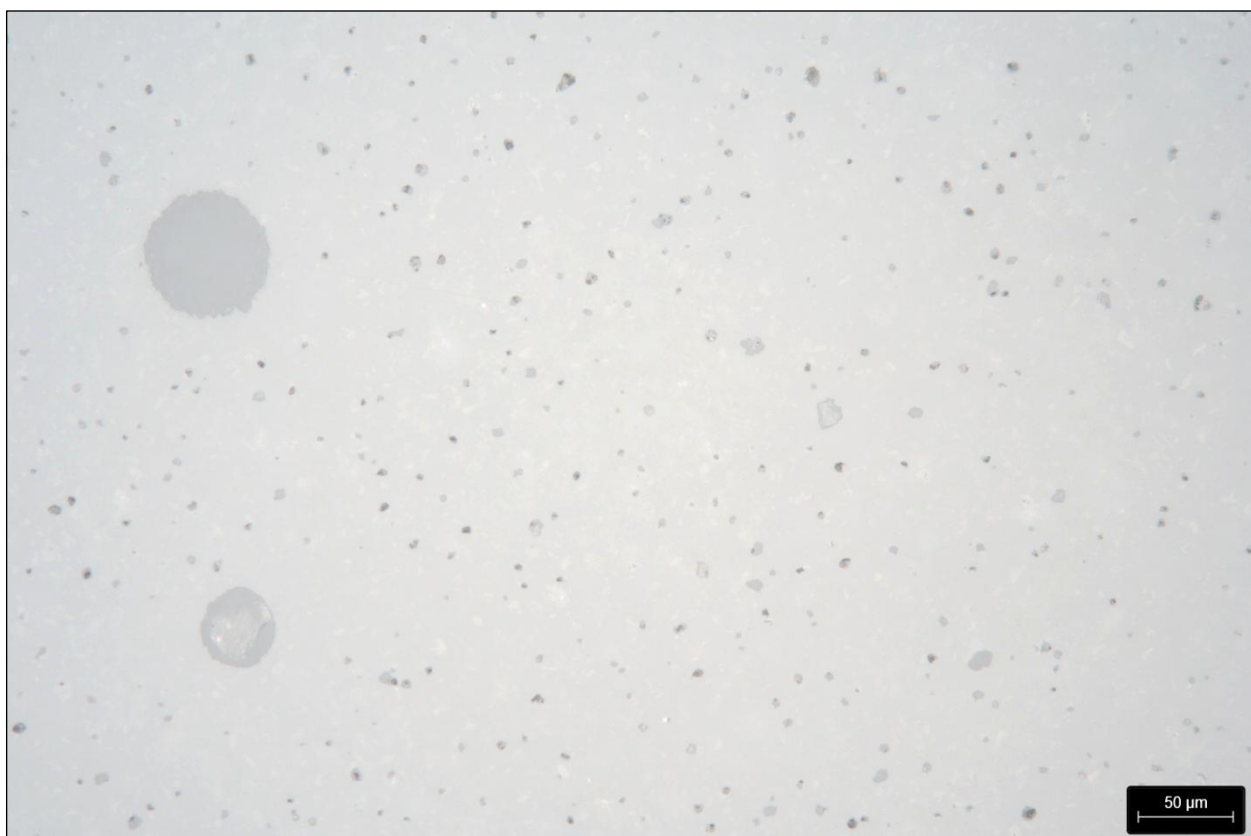


Figure 10. Sample Corderiet after preparation with Qpol 250 A1 Eco - core area - 200:1

QATM-Preparation method - Corderiet

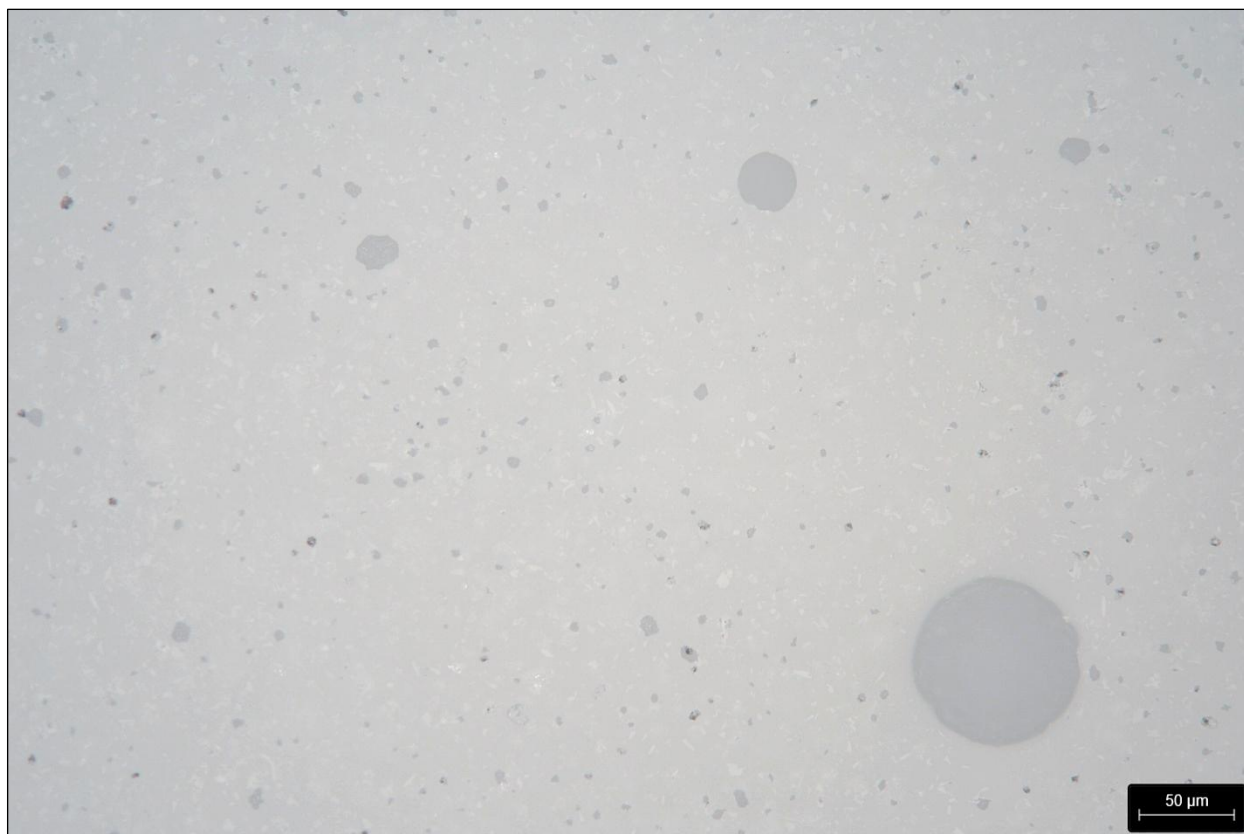


Figure 11. Sample Corderiet after preparation with Qpol 250 A1 Eco + Qpol Vibro (2h)
core area - 200:1

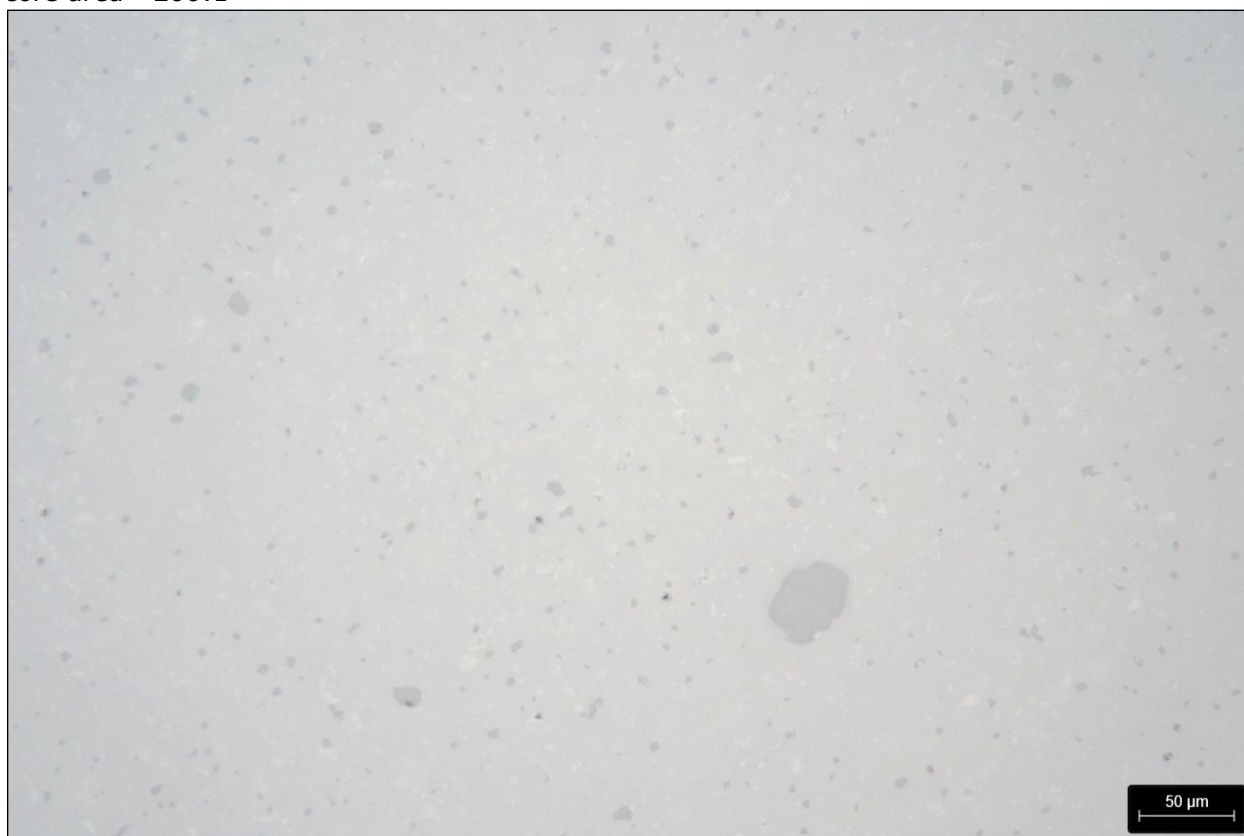


Figure 12. Sample Corderiet after preparation with Qpol 250 A1 Eco + Qpol Vibro (4h)
core area - 200:1

QATM-Preparation method

Consumables and accessories used:

	Consumables and accessories	Article description	Item number
Cutting	Cut-off disc	Diamond cut-off disc ø 150 mm	95008773
	Cutting coolant	Coolant ATM-CoolCut	95004146
	Filter system	Filter	95017307
	Clamping tool	Qtool 40	Z2270200
	Clamping tool	Easy clamping plate S	Z2236030
Mounting	Cold mounting material	KEM 20 Set	95013990
	Mounting mould	Qmould Clear, ø 40 mm	95017575
	Mounting aid	Qprep Pressure Unit	95016569
Grinding	Sample holder	Sample holder M	Z5442024
	Sample holder	Sample holder M	Z5445025
	Sample holder	Qpol Vibro sample holder	Z5651011
	Accessories	Qpol Vibro levelling plate	Z5651013
	Grinding disc	VEGA 54 µm	95015028
	Grinding disc	VEGA 25 µm	95015029
	Fixing system	Magnetic foil ø 250 mm	95016346
Polishing	Polishing cloth	Galaxy BETA	95001411
	Polishing cloth	Galaxy GAMMA	95017589
	Polishing cloth	Galaxy ZETA	95005777
	Diamond suspension	Diamond susp., poly. 9 µm	92004801
	Diamond suspension	Diamond susp., poly. 3 µm	92004799
	Diamond suspension	Diamond susp., poly. 1 µm	92004798
	Fine polishing susp.	Eposil F 0,1 µm	92002536
Etching	-	-	-

QATM-Preparation method

Conclusion:

Cutting

The cutting process was not done with the samples. The parameters listed are only a recommendation.

Mounting

We recommend the cold mounting process and as cold mounting resin our KEM 20. The benefit of the resin is: QPREP KEM 20 is a universally applicable two-component cold mounting material based on a methyl methacrylate resin compound. Transparent mountings can be realized when curing under overpressure. For easy clamping into the sample holder of the Qpol Vibro we recommend to avoid using mounting moulds which have a chamfer.

Grinding

We recommend to use our diamond grinding discs VEGA 54 μm and VEGA 25 μm for the grinding process. The VEGA 54 μm should be used to grind the sample flat. VEGA 25 μm must be used for the fine-grinding step.

Polishing

We recommend starting the first polishing step with polishing cloth Galaxy BETA and 9 μm . Followed by the 3 μm polishing step where we use cloth GAMMA. The final polishing step should be done with polishing cloth Galaxy GAMMA and 1 μm .

The polishing with the Qpol VIBRO should be done with the polishing cloth Galaxy ZETA and as polishing suspension we recommend EPOSIL F 0,1 μm . We have done the vibro-polishing for 2 and 4 hours.