



NANOPURE™ FINAL POLISHING SLURRY

NP 8040

INTRODUCTION

Rodel Particle NP 8000 series final polishing slurries are Rodel's high purity slurries designed for the demanding requirements of final polishing of silicon wafers. These slurries have been formulated using the cleanest colloidal silica available along with proprietary chemical additives to create customized formulations to achieve high throughput in final polishing processes, while surpassing the stringent physical properties required for next generation wafers.

BENEFITS

- Low LPDs and Haze
- Optimized particle type
- Novel Additives
- Applications specific formulations
- Low metals in the bulk and on the wafer
- Low COO

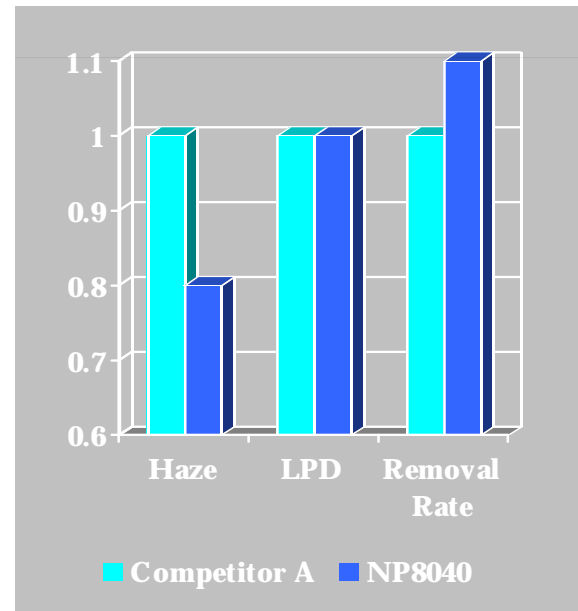
GENERAL PROPERTIES

NP 8040 Physical Properties	
Mean particle diameter (nm)	60 – 80
Specific gravity (g/cm ³)	1.015 – 1.025
Viscosity (cps)	30-50
% Solids	4 – 5
PH	10 – 11

NP 8040 Trace Metals		
Na	ppb	<10,000
K	ppb	<50
Mg	ppb	<20
Ca	ppb	<200
Cr	ppb	<10
Fe	ppb	<20
Ni	ppb	<10
Cu	ppb	<10
Zn	ppb	<30
Al	ppb	<50
Pb	Ppb	<200

*Alpha (pre-production) - subject to change without notice.

PERFORMANCE CHART



NP8040 at 40:1 dilution shows improved performance against competitive colloidal silica final polishing slurries for haze and LPDs at 0.12 um bin size..

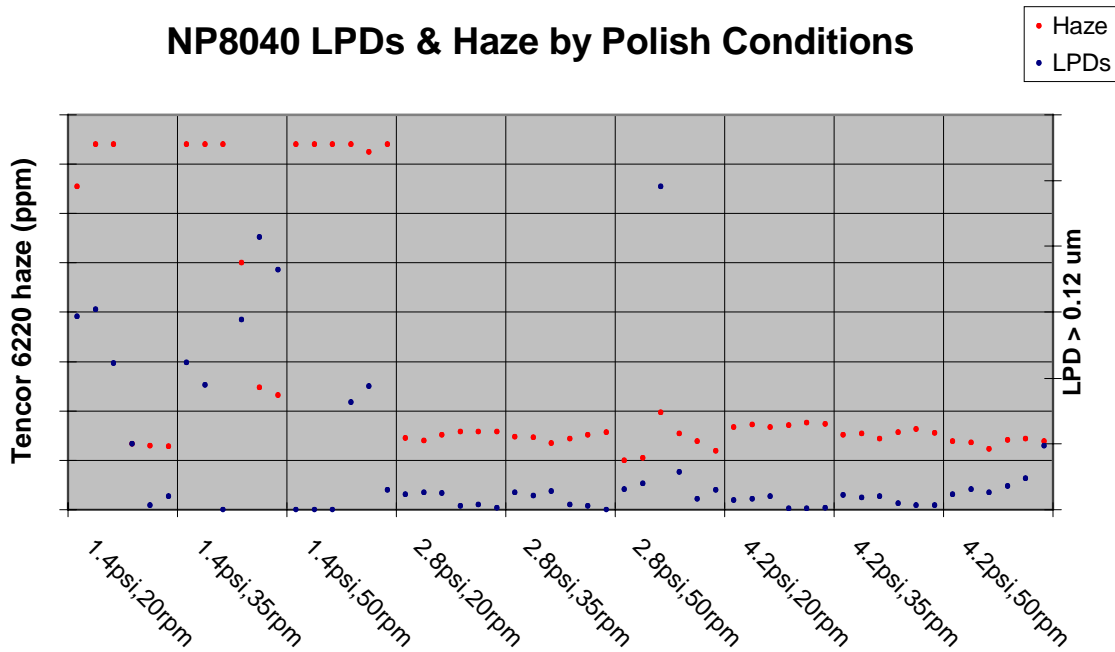
NP8040 is designed to have higher removal rate to help decrease processing time and COO.

PROCESS WINDOW

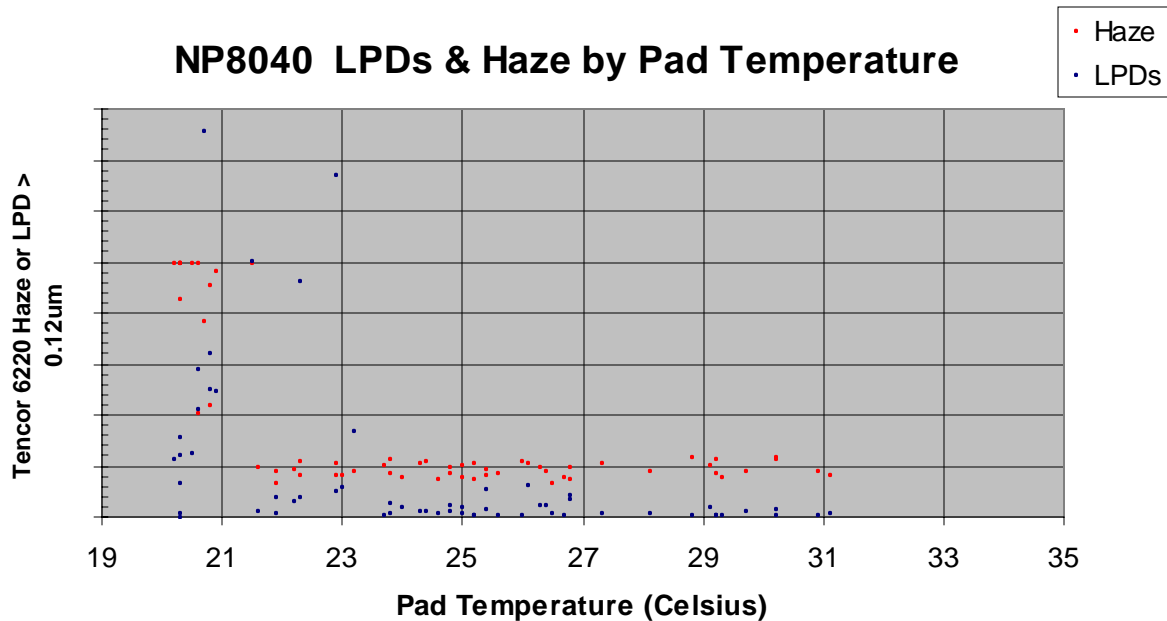
Because of the wide array of polishing equipment and processes that exist, polishing experiments were conducted in order to understand how NP 8040 slurry performs in a variety of processes. NP 8040 shows it is able to achieve excellent LPD and haze results over a fairly wide range of processes. Down force is examined in the range of 1.4 psi to 4.2 psi; platen speed is examined in the range of 20 rpm to 50 rpm.

The process regime that proves problematic is the combination of low down force and high platen speed. These process conditions promote wafer hydroplaning in conjunction with a loss of removal rate. A drop in pad temperature is a clear symptom that hydroplaning is occurring. As pad temperature is easily measured in-process, pad temperature is a useful variable that should be carefully controlled. The recommended pad temperature range is 25 °C to 31 °C.

NP8040 LPDs & Haze by Polish Conditions



NP8040 LPDs & Haze by Pad Temperature



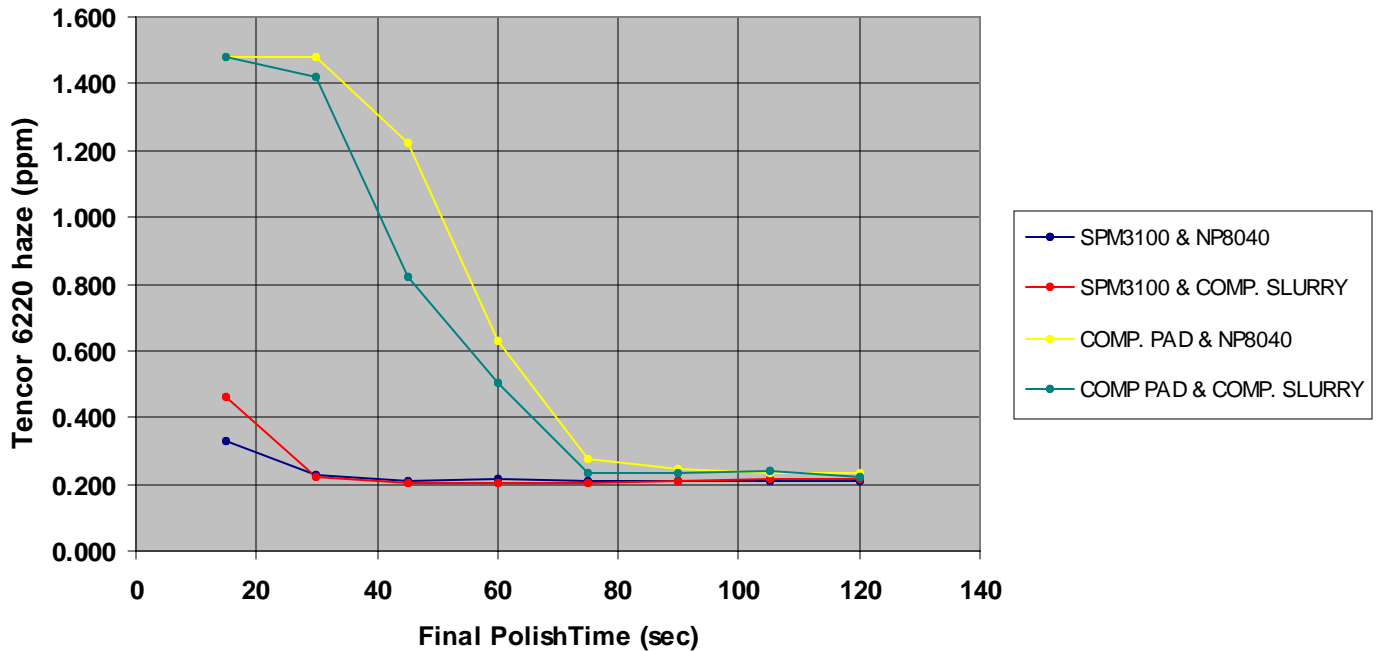
PROCESS DETAILS

The data above was generated using 200 mm P type Silicon wafers of (1,0,0) crystal orientation and a resistivity of 0.005 - 0.01 ohm-cm. KLA-Tencor 6220 was used for haze and LPD measurements. Removals calculated by pre and post-polish weight difference. Cleaning consists of SC1 bath with Megasonics and IPA dryer.

POLISHING TIME STUDY

Many Silicon wafer fabs require shorter final polish times in order to increase capacity particularly as larger diameter substrates are adopted. In order to address this development, NP 8040 slurry haze performance was evaluated at polishing times ranging from 15 seconds to 120 seconds. NP 8040 was compared to competitor final slurry on two pads, Rodel's SPM 3100 final pad and a competitor pad. As illustrated in the chart below, NP 8040 slurry produces equivalent haze levels to the competitor slurry regardless of the final pad used. In addition, the Rodel final pad exhibits its ability to achieve superior haze levels with a 45 second polish compared to the competitor pad after a 120 second polish.

NP8040 Haze vs. Final Polishing Time



PROCESS DETAILS

The data above was generated using 200 mm P type Silicon wafers of (1,0,0) crystal orientation and a resistivity of 0.005 - 0.01 ohm-cm. KLA-Tencor 6220 was used for haze and LPD measurements. Removals calculated by pre and post-polish weight difference. Cleaning consists of SC1 bath with Megasonics and IPA dryer.

DISPENSING & MIXING

NanoPure 8040 slurry is designed for 40:1 dilution with water to achieve desired surface finish results. Dilution at other ratios may result in reduced LPD and Haze performance.

SOURCE DRUM

NanoPure 8040 is a well-suspended slurry that will stay fully dispersed without agitation. Continuous source drum mixing is acceptable, but not necessary.

DISPENSE SYSTEM

Storage and mixing tanks and distribution piping for the diluted slurry should be constructed of engineering plastic such as polyethylene, polypropylene or Teflon®. Materials such as aluminum, copper, brass and PVC should be avoided. A continuous recirculation loop is recommended to keep the diluted slurry well mixed.

Use splash goggles or a full face shield when dispensing liquids to avoid eye injury. Avoid skin contact.

Avoid exposure of slurry (concentrate or dilute) to air as this results in evaporation of the more volatile stabilizing components. Leaving containers open may also result in drying and crystallization of the silica abrasive component, which can cause scratching.

Rinse all transport lines, flow meters and other equipment with pH adjusted DI water after use and prior to exposing to air.

SHIPPING, HANDLING AND STORAGE

Always check the condition of containers (drums or pails) as well as all temperature indicators immediately upon delivery. Accept deliveries only if the shipment and recorders are intact and do not indicate exposure to freezing temperatures. Shippers are responsible for damaged material until shipments are accepted. If material is damaged (due to handling or temperature exposure), the shipment should be refused, and a claim should be filed with the carrier handling the delivery. Please contact your Rodel representative for a replacement shipment.

NP 8040 slurry will freeze if exposed to temperatures below 5 °C. Freezing will cause irreversible product degradation. To help ensure that freezing does not occur, a Cox temperature recorder is included with each pallet of shipments of four drums or more. For smaller shipments, a freeze indicator is attached to drums, pails, and totes. As a safeguard against potential slurry supply shortage due to frozen shipments, Rodel suggests building inventory prior to the onset of the winter months.

NP 8040 slurry can be stored for up to one year between 5 °C and 50 °C. Maintain storage in a temperature-controlled environment for best results. Avoid prolonged exposure to temperatures at either extreme.

Storage in aluminum, copper, brass or PVC is not recommended. Storage equipment should be made of polyethylene, polypropylene, PTFE or other reinforced engineering plastic. Tanks, piping and handling equipment can be washed and cleaned with water to remove any deposits due to evaporation.

Consult your Rodel representative for recommendations when designing equipment or handling systems.

www.rodel.com
info@rodel.com

UNITED STATES

Phoenix, Arizona
Tel: 602.431.0500
Fax: 602.431.0200

Newark, Delaware
Tel: 302.366.0500
Fax: 302.366.0187

Customer Service
800.404.8775

24/7 Technical Hotline
(USA) 800.763.3526
(Int'l) 520.882.1764

EUROPE

Feldkirchen, Germany
Tel: 49.89.904.8370
Fax: 49.89.904.83799

Mimet, France
Tel: 33.4.42.69 9418
Fax: 33.4.42.699419

TAIWAN

Tainan Hsien
Tel: 886.6.2828908
Fax: 886.6.2514145

Hsinchu City
Tel: 886.3.572.5899
Fax: 886.3.573.6800

KOREA

Seoul
Tel: 82.2.598.4881
Fax: 82.2.598.4882

MALAYSIA

Penang
Tel: 60.4.370.1212
Fax: 60.4.370.1010

SINGAPORE

Tel: 65.861.9153
Fax: 65.862.5976

JAPAN

Nara Prefecture
Tel: 81.743.56.8241
Fax: 81.743.56.1297

Tokyo
Tel: 81.3.3572.1637
Fax: 81.3.3571.5684

Osaka
Tel: 81.6.6563.1291
Fax: 81.6.6563.1292

© Rodel 2001 All Rights Reserved

NanoPure™ - NP 8040
Application Notes Rev. 1.0 11/01