

Updating the EMS's

Co-Op Session III

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Revised EMS's

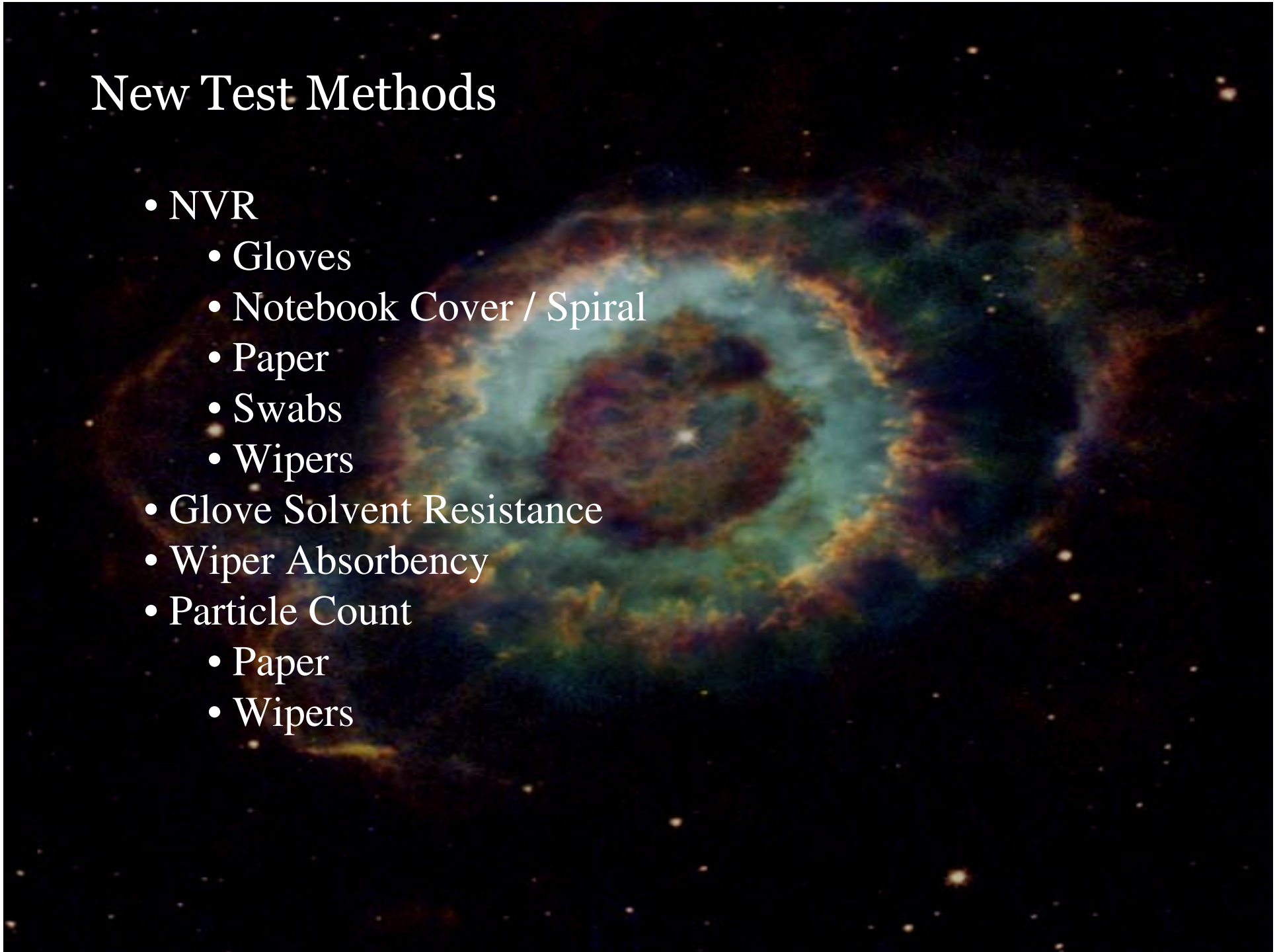
- Gloves (General Use)
- Wipers (Low Lint, Low Residue)

New EMS's

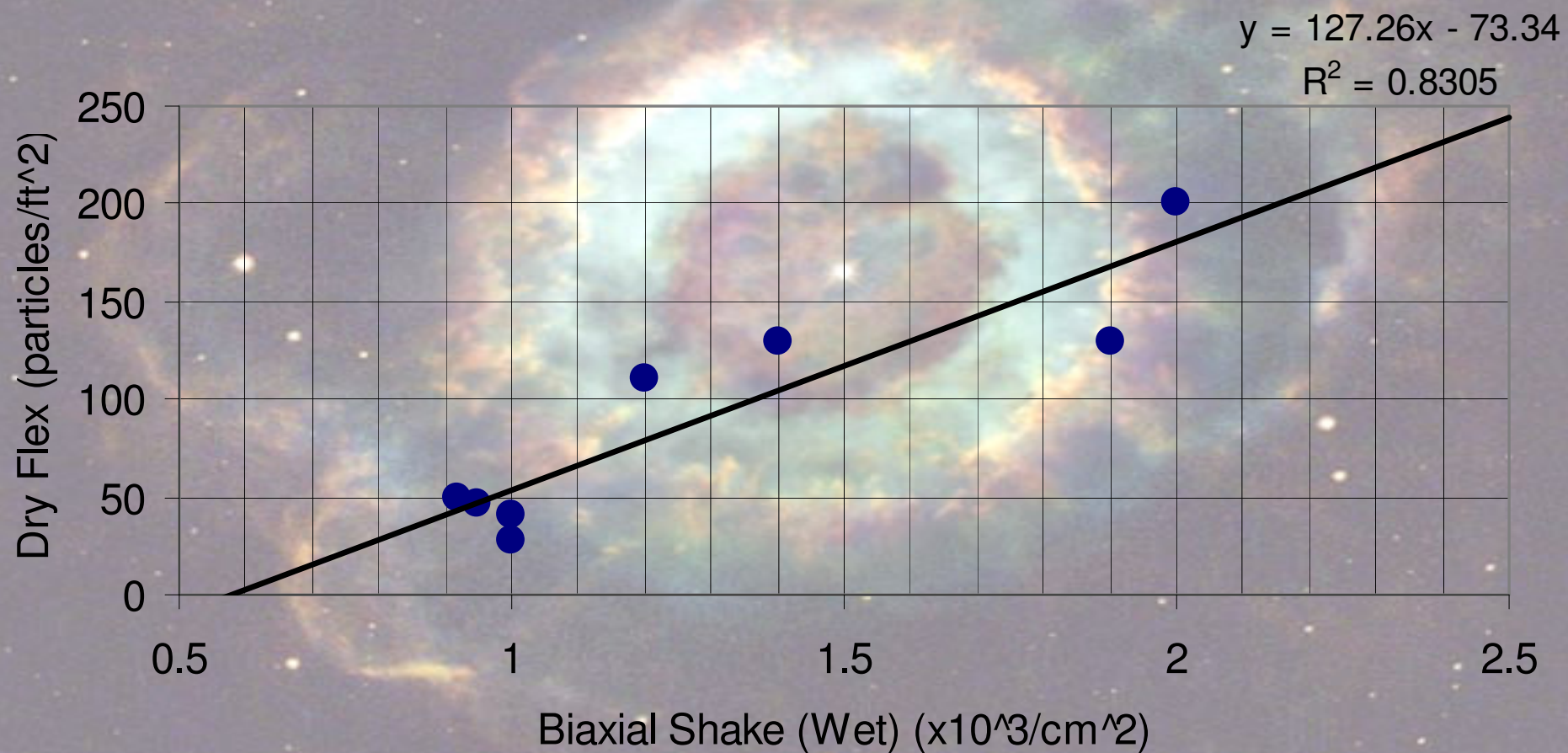
- Swabs
- Paper, Cleanroom
- Notebooks, Cleanroom

New Test Methods

- NVR
 - Gloves
 - Notebook Cover / Spiral
 - Paper
 - Swabs
 - Wipers
- Glove Solvent Resistance
- Wiper Absorbency
- Particle Count
 - Paper
 - Wipers



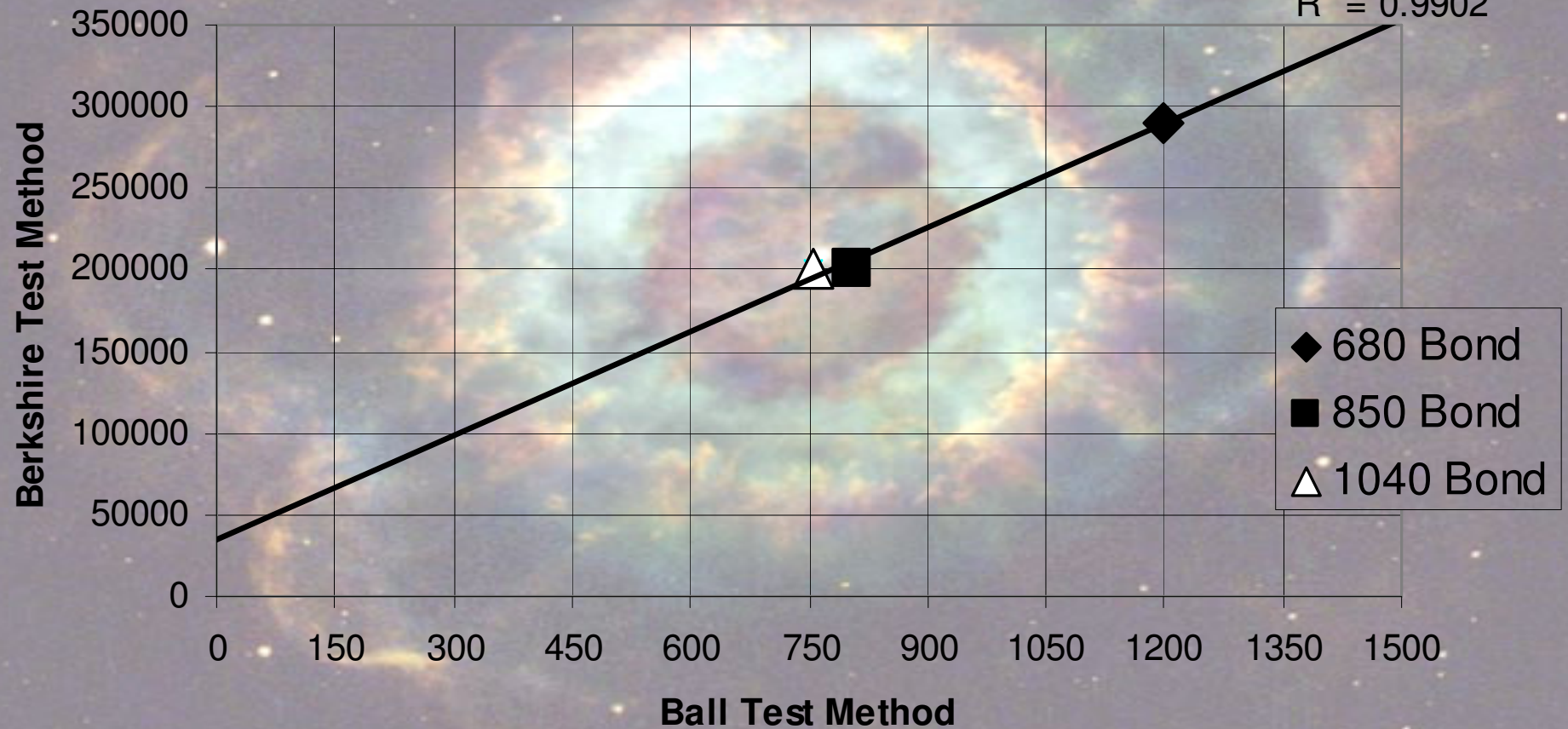
Berkshire Wiper Wet vs Dry Particle Count Test Comparison



Paper Particle Count Test Comparison

$$y = 213.15x + 34028$$

$$R^2 = 0.9902$$



Gloves

General Use

Critical Properties

- Non-Volatile Residue (NVR)
- Fourier Transform Infrared Spectroscopy (FTIR)
- Solvent Resistance
- Pinhole Quality
- ESD Properties
- * Particle Count
- * Dry Transfer



Non-Critical Properties

- Comfort & Dexterity
- Wet & Dry Grip
- Odor
- Stick Together

Recommended Products (General Use Gloves)

- Allegiance - Nitrile Ambi CR10
- North Safety - ChemSoft CE
- Kimberly-Clark - SafeSkin Critical Nitrile
- Kimberly-Clark - SafeSkin NXT

Requirements

- $\text{NVR} < 8\text{mg}/0.1\text{m}^2$ (by new test method)
- No detectable silicone
- $< 1\text{E}12 \Omega\text{-cm}$ Volume Resistance
- Pinhole specs - 3.5 AQL (data from Manufacturer)

Wipers (Low Lint, Low Residue)

Critical Properties

- NVR / FTIR
- Particle Count
- Absorbency

Non-Critical Properties

- Durability
- Softness
- Size

Requirements

- $\text{NVR} < 3.5 \text{ mg}/0.1\text{m}^2$
- No detectable silicone
- < 1750 fibers and particles per 0.1m^2
- $> 20,000 \text{ mg}/0.1\text{m}^2$ absorbency with water



Recommended Products

- Berkshire - SpecWipe 7
- Berkshire - Microfirst LP
- TexWipe - Alpha 10 (TX1010)

TX609 does not satisfy particle count requirements

Swabs

- Many swabs have a polypropylene handle and polyester head material.
- Foam tipped swabs have significantly higher NVR than polyester tipped swabs.

Critical Properties

- NVR / FTIR
- * Particle Count
- * Solvent Resistance

Non-Critical Properties

- Size / Shape
- Absorbency
- Durability

Requirements

- $\text{NVR} < 0.01 \text{ mg/swab}$
- No detectable silicone

Recommended Products

- TexWipe - Alpha Series
- TexWipe - Absorbond Series
- TexWipe - Nylon Microswab
- Berkshire - Super Polx Sock Tip



Paper / Notebooks

Cleanroom Paper

Critical Properties

- NVR / FTIR
- Particle Count
- Ink Smear
- Mechanical Compatibility

Non-Critical Properties

- Color
- Size
- Opacity
- Lined / Gridded

Requirements

- $\text{NVR} < 1.5 \text{ mg}/0.1\text{m}^2$
- No detectable silicone
- < 1750 particles and fibers per 0.1m^2

Cleanroom Notebook Covers and Spiral

Critical Properties

- NVR / FTIR
- * Particle Count

Non-Critical Properties

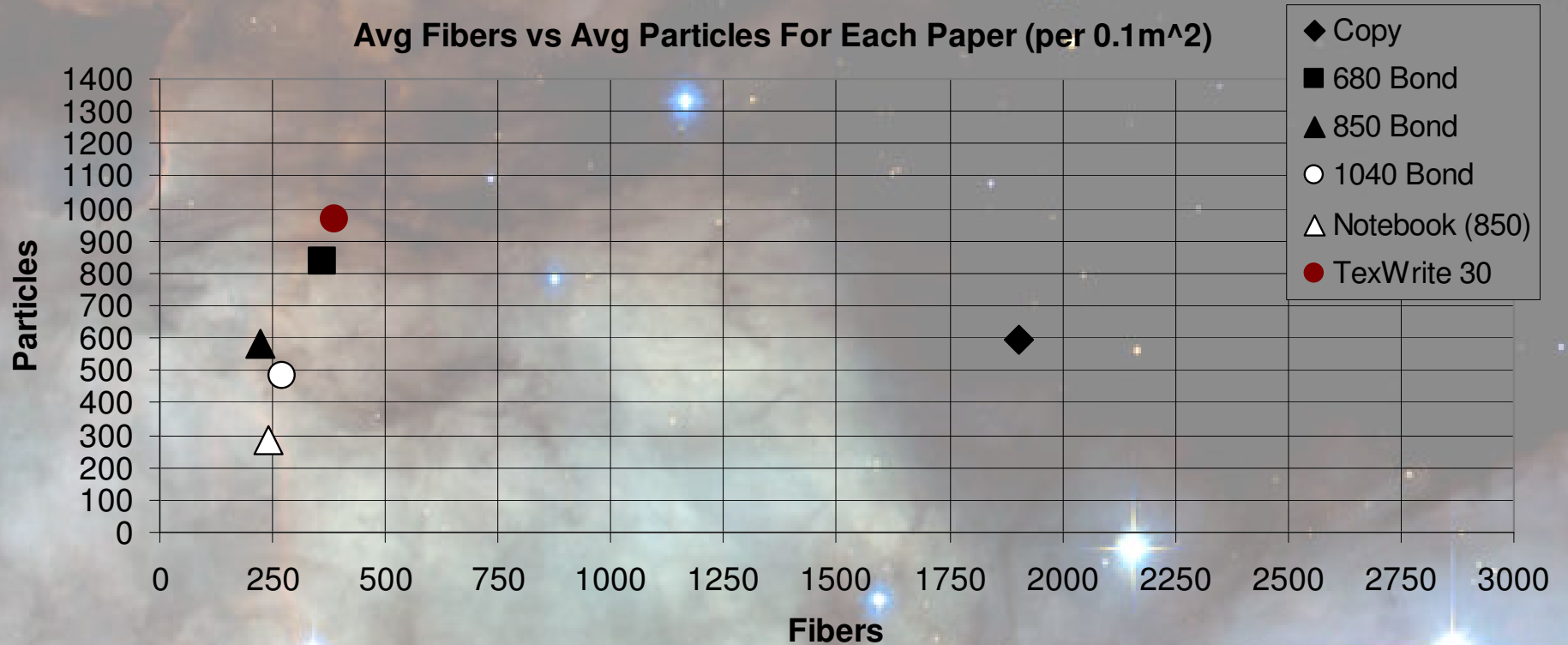
- Color
- Size
- Opacity

Requirements

- $\text{NVR} < 1.5 \text{ mg}/0.1\text{m}^2$
- No detectable silicone



Paper



Recommended Products

- TexWipe - TexWrite 30
- Berkshire - 850 Bond
- Berkshire - 1040 Bond
- Berkshire - 650 Bond

Recommended Products

- Berkshire - ValuNotes Notebook
(uses Berkshire 850 Bond)

Compression Pack Testing

PET box with urethane film that forms to securely hold anything put in the box.

Dangers of Compression Packs:

- Films contains free isocyanate
- NVR remains $> 2\text{mg}/0.1\text{m}^2$ despite cleaning methods
- Cannot be heated or put in a vacuum
- Difficult to open (especially the 1"x1" model)
- Latch may pop open if pressed incorrectly
- Shipping from Europe is unreliable

Good things about the Compression Packs:

- Securely hold delicate objects
- Dry Contact Transfer is $< 0.1\text{ mg}/0.1\text{m}^2$ per 24 hours
- Manufacturing process is moving to Chicago



OPAL Crystal Thermal Mechanical Analysis

Used to confirm Coefficient of Thermal Expansion literature data

Test Temperature Range

Warm Tests - 20 to 100 to 20 C @ 1deg/min

Cold Tests - 20 to -150 to 20 C @ 1deg/min



BaF₂

CaF₂

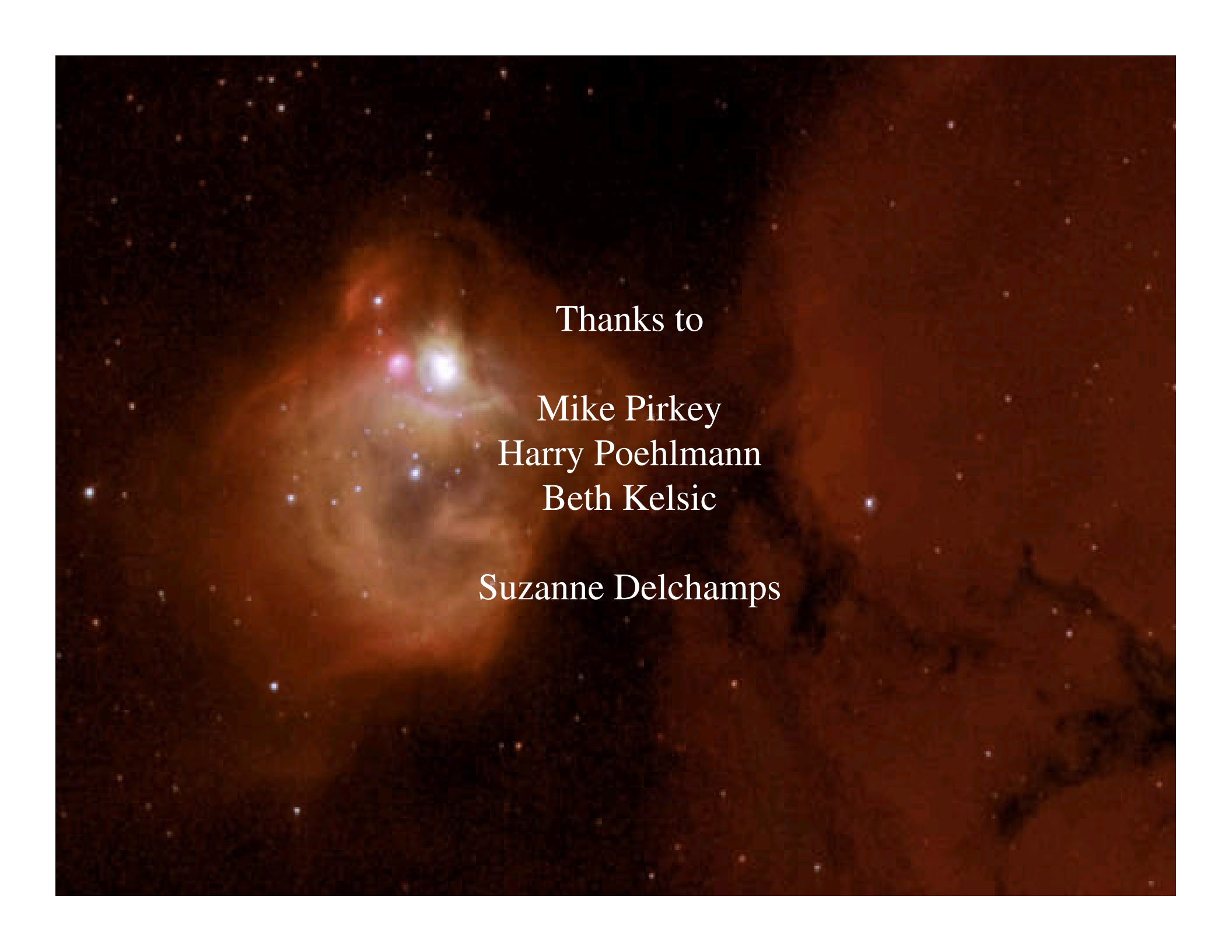
LiF

KCl

NaCl

Sap

ZnSe



Thanks to

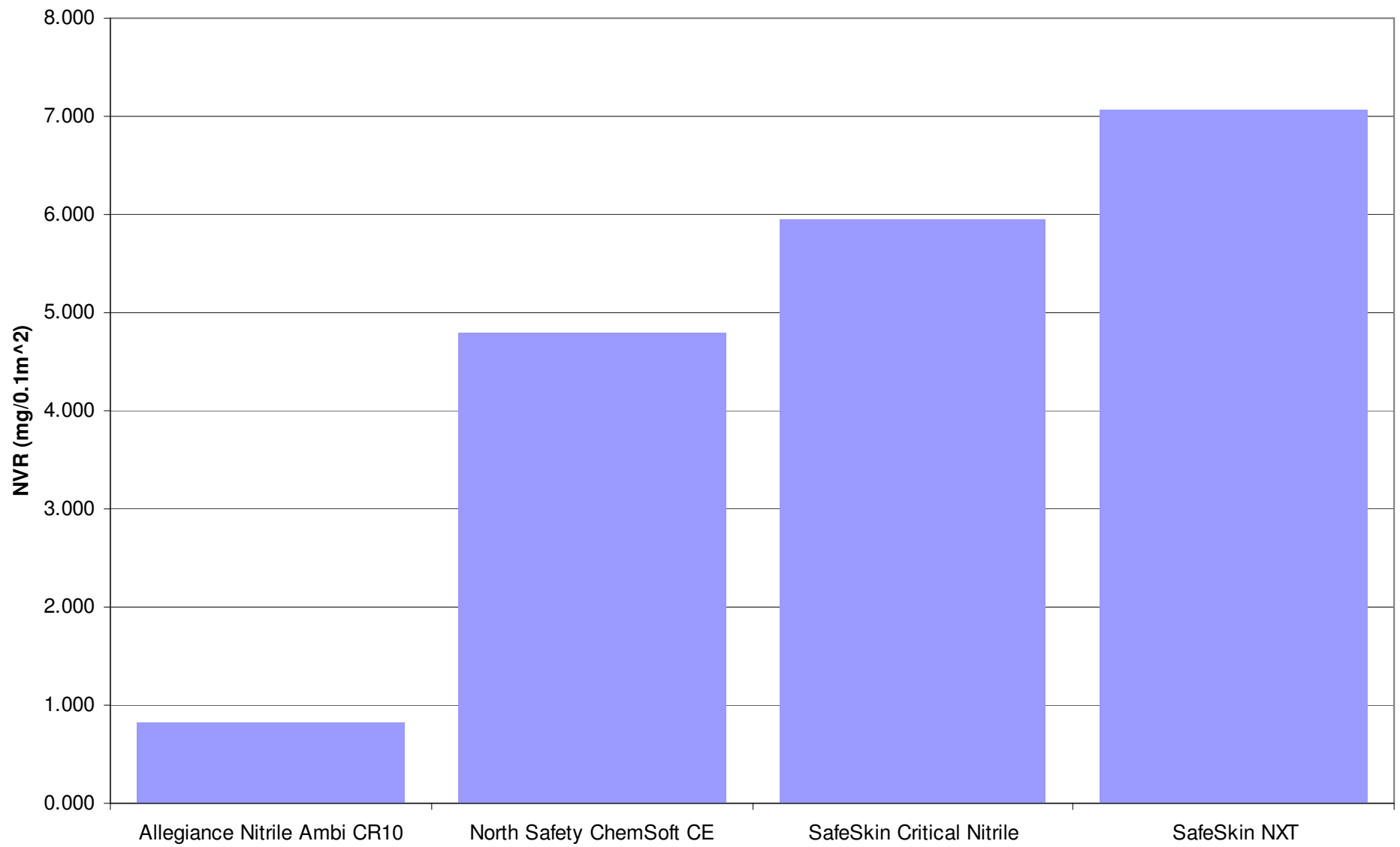
Mike Pirkey

Harry Poehlmann

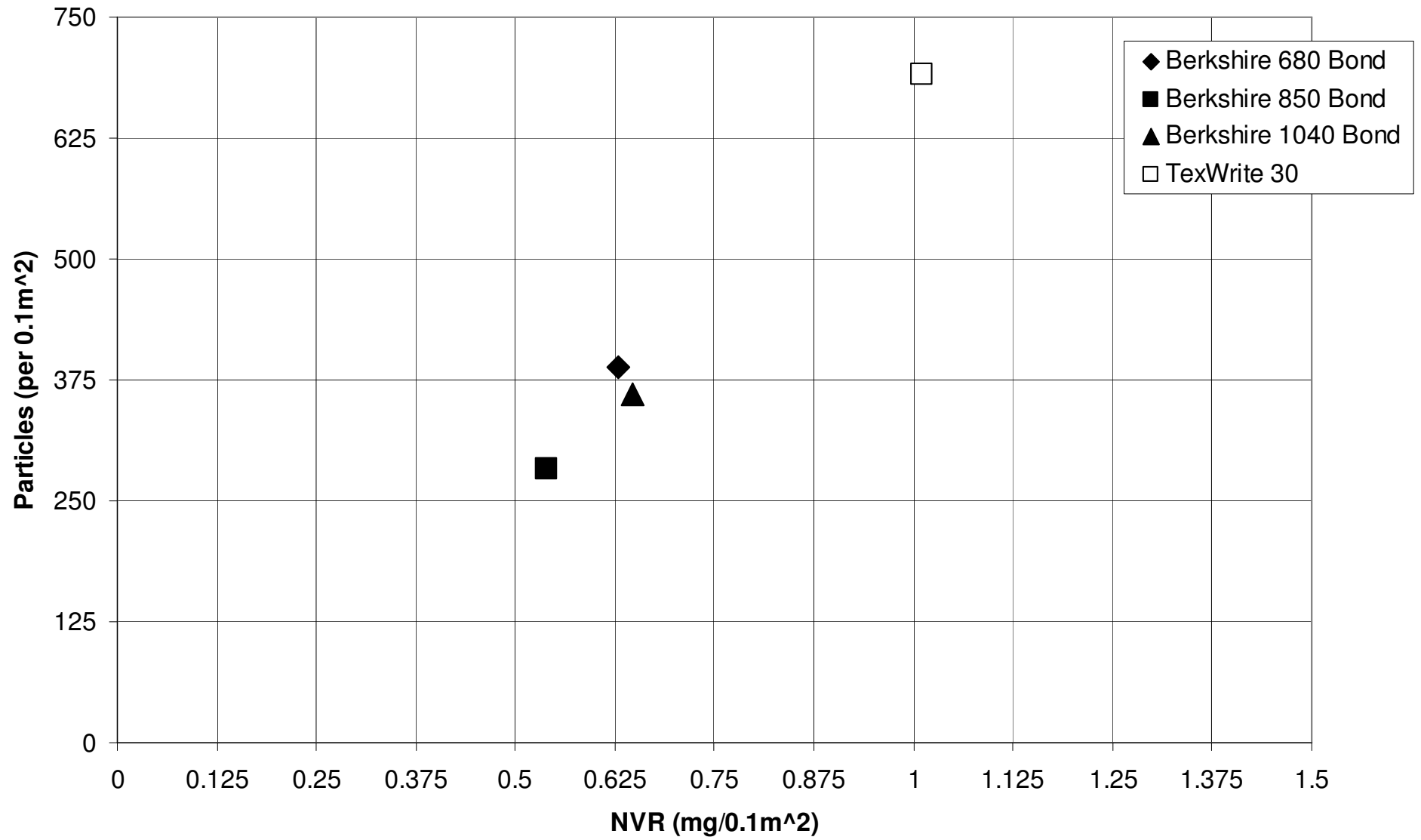
Beth Kelsic

Suzanne Delchamps

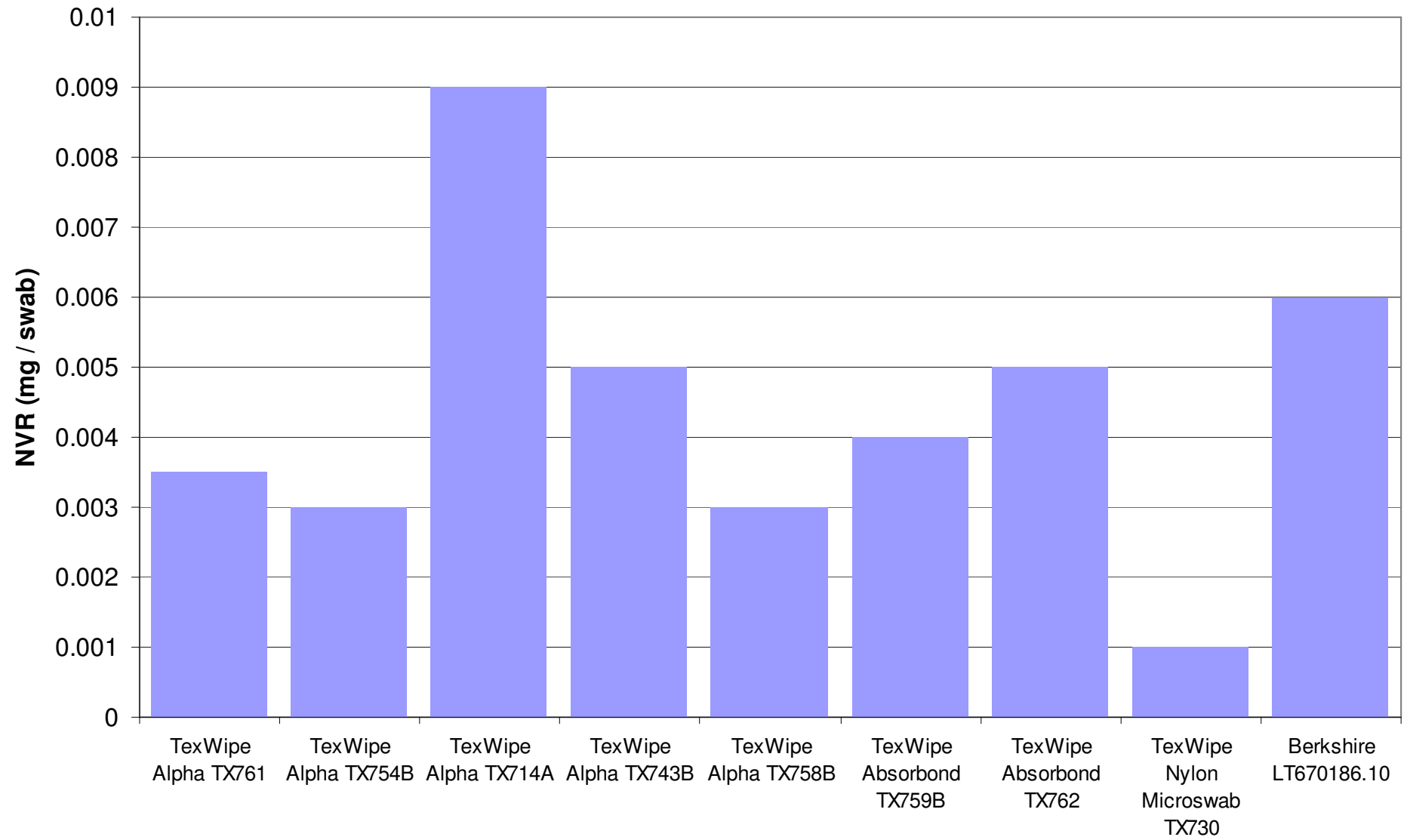
Acceptable Gloves



Aceptable Paper



Acceptable Swabs



Acceptable Wipers

