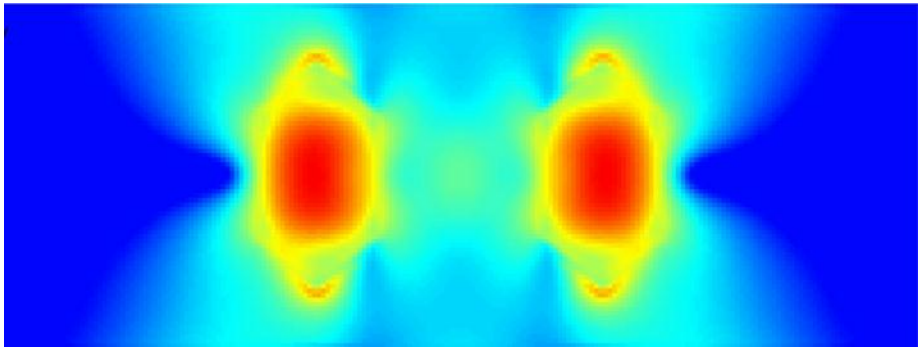
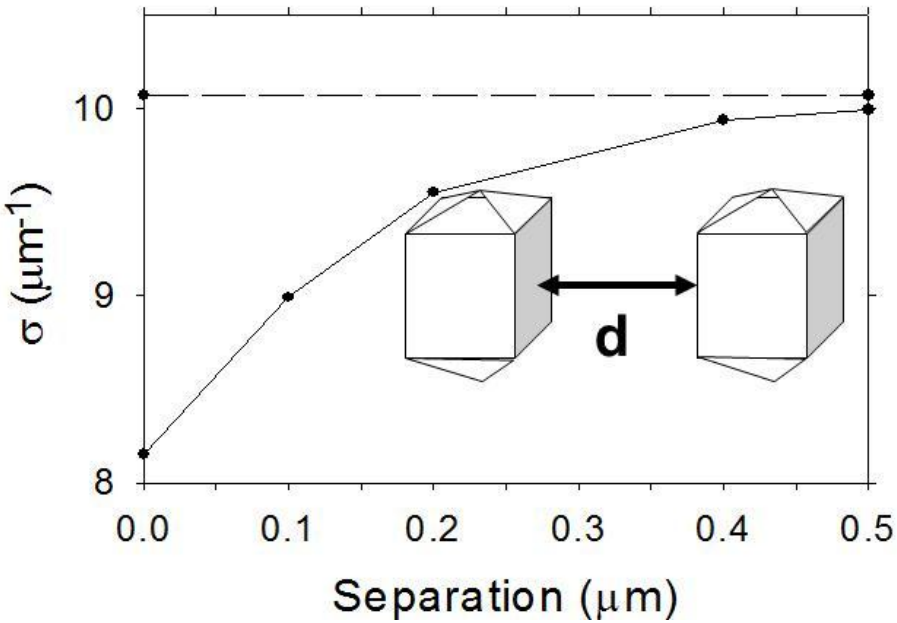
DuPont™ Ti-Pure® R-931

June 2012

Unfortunate Truth about Titanium Dioxide: TiO_2 Particles in close proximity scatter light less efficiently

- Scattering efficiency is a strong function of inter-particle separation
  - Scattering degrades as particles approach each other
- Interparticle interactions become important for separation distance < ~400 nm





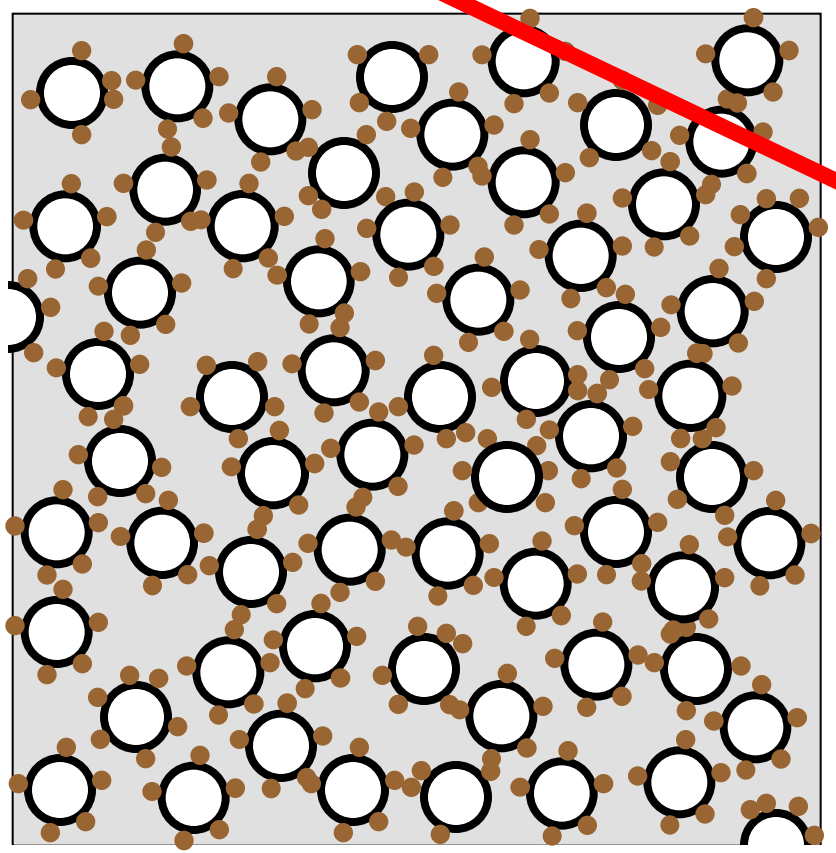
– **Penalty of Non-Ideal Spacing**
  - Diminishes light scattering power
  - More TiO_2 required to achieve desired hiding power

TiO_2 Non-Ideal Spacing Solution: Targeted Spacer Concept

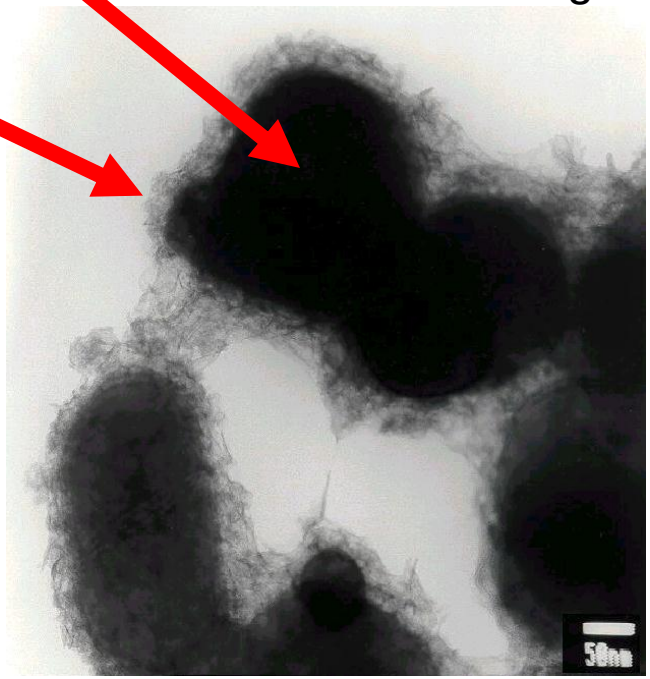
DuPont™ TiO_2 Technology

- Spacer particle

TiO_2 particle



DuPont™ Ti-Pure® R-931 TiO_2 for flat / matte architectural coatings



DuPont™ TiO_2 Grade Comparison

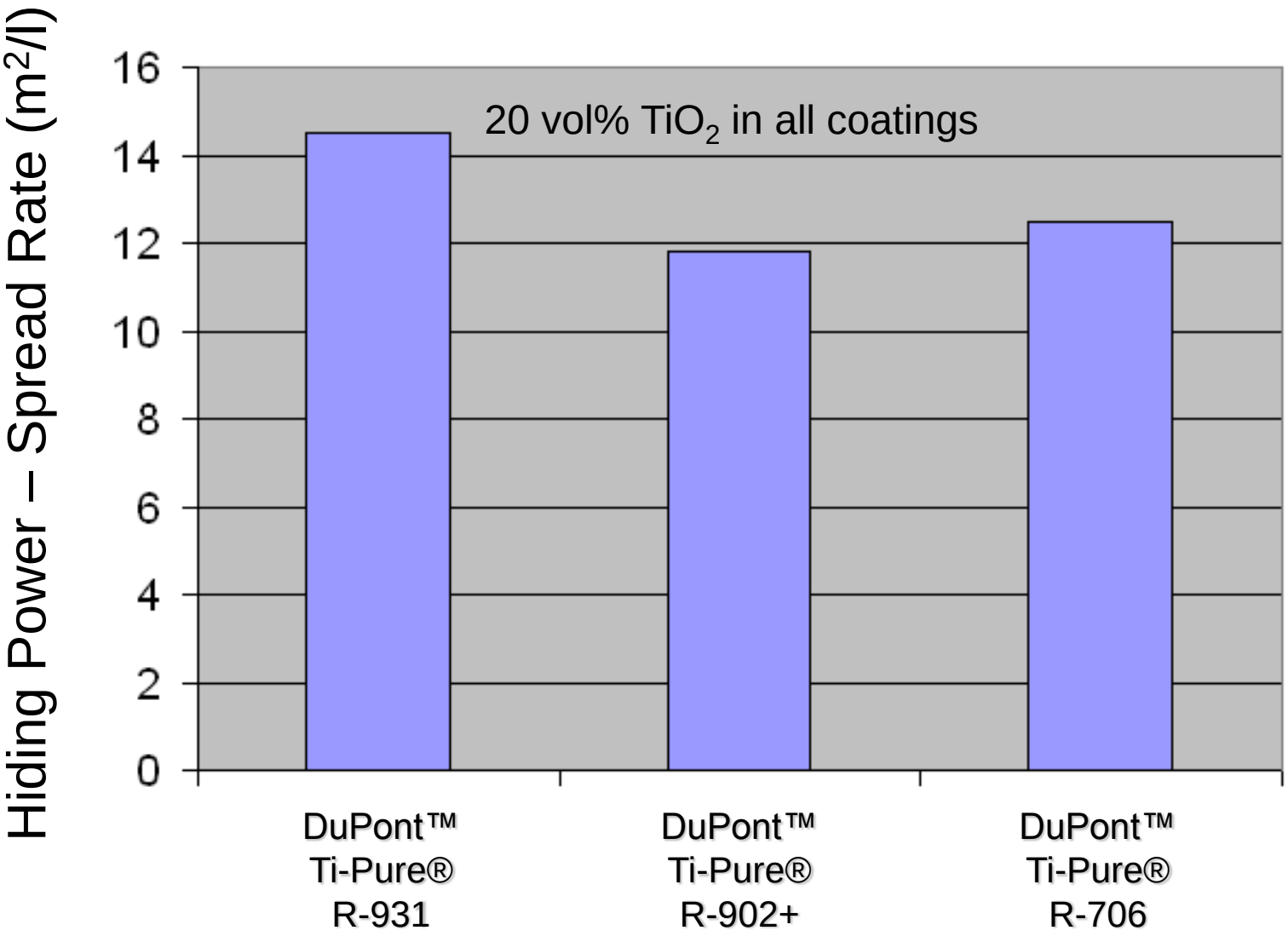
DuPont™ Ti-Pure® R-931 titanium dioxide

- >80 wt% TiO_2
- Fewer light scattering TiO_2 particles per kg pigment
- "Fluffy" alumino-silicate surface treatment
- Physical spacing of TiO_2 particles
- Potentially higher TiO_2 light scattering efficiency

DuPont™ Ti-Pure® R-706 and Ti-Pure® R-902+ titanium dioxide

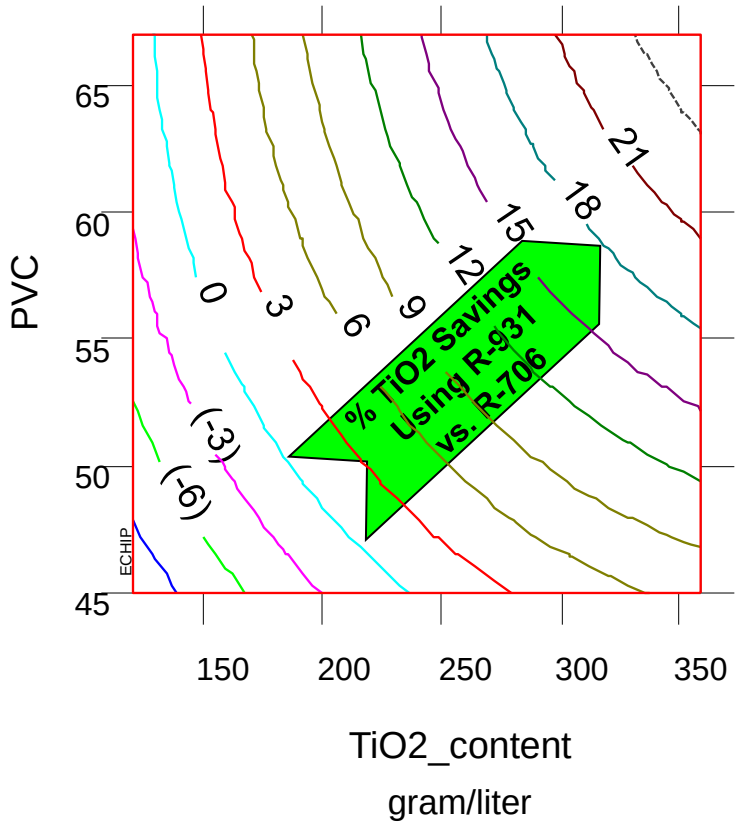
- >93 wt% TiO_2
- More light scattering TiO_2 particles per kg pigment
- Dense silica / alumina surface treatment.
- No physical spacing of TiO_2 particles

Example: Hiding Power Comparison in 47% PVC Flat Coating



TiO2 Reduction Potential of DuPont™ Ti-Pure® R-931 versus Ti-Pure® R-706

Potential % TiO2 Savings with Ti-Pure® R-931



Conducted Experimental Design

- Varied TiO_2 content (gm TiO2 / liter)
- Varied total PVC
- Tested R-931 vs “Universal” TiO_2

Using regression modeling of paint data, identified conditions of comparable wet and dry hiding power

Created profile of potential % TiO_2 savings using R-931 versus R-706 maintaining equal hiding power

Ti-Pure® R-931 TiO_2 savings potential increases with increasing coating TiO_2 concentration and increasing coating PVC

Formulating with DuPont™ Ti-Pure® R-931 TiO_2

Benefits

Improved Hiding Power

- Better spacing of TiO_2 particles

Opportunity to Reduce TiO_2 Content in appropriate formulation space

Proven technology

Concerns

Formulation space is limited

- *Ti-Pure® R-931 will be less efficient than universal grades in coatings with lower TiO_2 content and lower PVC.*
- *Ti-Pure® R-931 will diminish coating gloss*
- *Will need to carry inventory of multiple TiO_2 grades to produce full coating portfolio*

Ti-Pure® R-931 has Higher Oil Absorption

- *Lowers Critical PVC*
- *Potential rheology impact*

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