“Working from Home”
Webinar Series:
Anti Fingerprint Solutions
THANK YOU FOR JOINING US

Presenters

• Edward Hughes  CEO
• Eric Bruner PhD  President
• Mario Gattuso  Sr. Business Development Mgr

Logistical

• Recorded

• Ask questions via GoTo Meeting question tab
• Hope everyone is well and safe

• Pandemic – scope, speed, stakes

• Ability to adapt –”WFH”

• Essential company

• Be there for you when we come out of this
OUR GOAL

Aculon enables customers to make better products by being an innovative, responsive and fast developer and producer of best in class surface modification technologies.

Together we create winning products!
AGENDA

• Aculon Overview
• Anti-Fingerprint Approaches
  – Coatings
  – Texture
  – Color
• AFP Characterization
• Bonus Material
• Q&A
ACULON OVERVIEW

Founded 2004

- **Expertise**
  Develop & produce surface solutions to modify a broad variety of surfaces (metals, glass, polymers).

- **Functionality**
  Hydrophobic, superhydrophobic, oleophobic, hydrophilic, anti-fingerprinting, adhesion promotion

- **Treatments**
  Thin, easy to apply (no vacuum chambers), often no cure, safe, non-toxic and offer green options.

- **Differentiation**
  Create proprietary innovative treatments & willingness to work with customer to solve problems.

- **Focus areas**
  Electronics, Oil & Gas, Specialty (Medical +other)

- **Business Model**
  Produce chemistry & treat parts

- **IP**
  Over 35 Patents granted. Worked with 1000’s applications, invested 100,000’s hours

- **Products:**
  > 100

- **People:**
  Smart (numerous Chemists with PhD’s & Masters Degrees, Electrical & Mechanical Engineers)

- **Global**
  Locations:  San Diego (HQ, Lab & Manufacturing) Shanghai, Singapore, Dallas, Amsterdam, Distributors  > 12 in Asia

Aculon, Inc. @ 2020
MANY SURFACE MODIFICATION PLATFORMS

Hydro/Oleophilic
Surface Polymer Growth
Transition Metal Complexes
Polymeric Organometallics
SAMP & Organometallics
TAILORING THE “R” GROUP STRATEGY

“Hook”
- Strong Chemical Bonds – Resistant to Abrasion
- Chemically Resistant – Stable as the Underlying Substrate
- Thermally-Stable – up to 175-250°C in ambient air.

“Tail”
- Surface Functionality – Lubricity, Cleanability, Surface Energy
- Interfacial Functionality – Reactivity, Adhesion of Polymers

Example "R" Groups
- R = -OH
- R = CH₃
- R = -COOH
- R = CF₃
- R = C₂H₅
- R = S

ACULON

Substrate

Metal oxides
PRODUCT GROUPS

- Repellency treatments
- Attraction treatments
- Anti Fingerprinting Treatments
- Surface Primers
- Waterproofing Treatments
- Hard Coats
- Surface Cleaners

FUNCTIONALITIES

- Hydrophobic
- Superhydrophobic
- Oleophobic
- Hydrophilic
- Superhydrophilic
- Anti-fingerprinting
- Adhesion promotion
The application process depends on the application but can include:

- Dip Applied
- Spray Applied
- Wipe Applied
- Roll to Roll

Parameters:
- Concentrations
- Solvent
- Coverage
- Temperature
EXPERTISE AND PLATFORMS

- Display & Optical Lens Modification
- Adhesion Promotion
- Hydrophilics
- Water barrier protection (Electronics)
- Anti-Fingerprint Treatment Options
- Metal Treatment (Electronics & Industrial)
- Enhanced Oil Recovery & Anti-Fouling

Aculon, Inc. @ 2020
WHAT PROBLEM ARE WE SOLVING

Fingerprints can ruin the aesthetics of product surfaces and degrade the optical quality of touchscreens.
WHAT PROBLEM ARE WE SOLVING

Fingerprints are a pressing issue for numerous markets including:

Laptop cases
Mobile Devices
Consumer appliances
Optics

However solving fingerprinting issue is a complex and multi faceted problem.

Need multiple approaches to tackle the problem at the same time!
What approach can be utilized to tackle the issue of fingerprinting?

#1 Surface Treatments & Coatings:

- Anti-fingerprint (AFP) – Focus on Hiding Power
  - Hiding of initial fingerprint by tuning surface energy
- Easy-Clean (EC)
  - Easy removal of Oils with Oleophobic coatings >75°
AFP COATINGS – HIDING POWER

Extremely thin optically clear AFP – Hiding Power treatments are applied to the surface which:

• Hide the oil of the fingerprint
  • Allow light to pass, significantly reducing its appearance

• Offer Easy Clean Properties
  • Hydrophobic behavior assists with making it easier to clean fingerprints without chemicals

• Durable
  • Robust coatings offer ongoing AFP performance after normal handling
AFP COATINGS – EASY CLEAN

Extremely thin optically clear easy clean treatments are applied to the surface which:

• Increase oleophobicity & hydrophobicity
  • Significantly improves the ease of cleaning fingerprint contaminated surfaces

• Allow for cleaning with no solvents
  • Remove fingerprints with dry cloth wipe

• Durable
  • Robust coatings offer ongoing AFP performance after normal handling
ANTI FINGERPRINT TREATMENT DURABILITY

Aculon Anti Fingerprint solutions are designed to be durable to abrasion and handling for long lasting performance

* Water and oil contact angles were taken after 2000 cycles of linear abrasion with 600g/cm² pressure applied to an isopropanol soaked polyester cloth.
What approach can be utilized to tackle the issue of fingerprinting?

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  - Easy removal of Oils with Oleophobic coatings >75°

#2 Texture: Gloss or Matte Finish
- Through increased roughness a matte finish is created which hides the Fingerprint through diffuse reflectance.
  - The surface roughness will drive the type of AFP coating that is an ideal match to maximize performance.
EFFECTS OF TEXTURE – FINGERPRINT BEHAVIOR

Matte Finish
- Results in diffuse reflection
- Helps to hide appearance of fingerprints

Glossy Finish
- Results in specular reflection
- Maximizes appearance of fingerprints
EFFECTS OF TEXTURE – VIEWING ANGLE

Viewing Angle (Angle of Incidence) impacts appearance of fingerprints

High Viewing Angle
• Glossy substrates show improvement
• Matte substrates show more fingerprinting

Medium Viewing Angle
• Glossy and matte substrates show improvement

Low Viewing Angle
• Matte substrates show improvement
• Glossy substrates show more fingerprinting
By better understanding the impacts of texture on fingerprint behavior it can be used to your advantage

- Increase matte level to further hide fingerprints
- Adjust surface texture in parallel with AFP Coatings to maximize desired performance
- Utilize knowledge of viewing angle impacts to your advantage
What approach can be utilized to tackle the issue of fingerprinting?

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#2 **Texture:** Gloss or Matte Finish
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#3 **Color:** Light Absorption of Surface
Lighter Colored Substrates Reflect More light and are Less Sensitive to Light Absorption by Smudge
EFFECTS OF COLOR – DARK VS LIGHT

High absorbance – Darker substrates have high levels of absorbance and are very sensitive to small changes in reflectivity such as would be caused by a fingerprints. Results in fingerprints being highly visible without any attention to texture or surface treatment.

Low absorbance – Lighter substrates have low levels of absorbance and thus are far less sensitive to changes in reflectivity. Tend to naturally do a good job at hiding fingerprints so focus can be on ease of cleaning to assist with removal of fingerprint oils.
EFFECTS OF COLOR

Color impacts the substrates native fingerprint Hiding power

- Darker colors tend to show a higher level of fingerprinting than light
  - Benefit from treatments focusing on Hiding Power
- Light colors naturally do a better job of hiding fingerprints due to high reflectivity
  - Lighter colors tend to benefit more from treatments with focus on ease of cleaning
- Different colors may require individual solutions where all else remains the same!
How do we characterize smudging and fingerprints?

Glossmeter: BYK micro Tri-Gloss or Elcometer 480 Triangle Model T
Both read gloss in % reflectance at three angles 20/60/85 degrees
- Measure the Gloss of the Surface
- Can measure initial level of smudging with Human fingerprint
- Can measure remove of smudge (Removal vs # of Wipes)

How do we characterize textured/colored surfaces?

BYK iMac - Total color impression of effect finishes

The appearance of effect finishes is influenced by different viewing angles and viewing conditions. Apart from a light-dark flop and color shift special sparkling effects can be created. The BYK-mac i measures both multi-angle color and flake characterization.
- Traditional 5-angle color measurement: 15° / 25° / 45° / 75° / 110°
- Additional color measurement behind the gloss for color travel of interference pigments: -15°
- Sparkle and graininess measurement for flake characterization
SUMMARY

Aculon AFP Coatings – A solution for all textures and colors

- Texture has a significant impact on fingerprint visibility – where possible utilize matte texture. Color plays a large role in absorbance. Different colors may require different AFP solution.
- Aculon AFP - Improve Hiding Power on all substrates including difficult dark substrates
- Tuning surface energy can provide better initial AFP spreading and hiding properties
- Aculon AFP - Improve ease of cleaning on all substrates to achieve anti-fingerprint properties. Matte is preferred in all scenarios over polished.
- Oleophobic (>75 OCA) SAMPS provide easy-to-clean properties and are durable to mechanical abrasion.

Aculon AFP technologies enable improved hiding power and ease of cleaning on all substrates
Aculon NanoProof® Series provides water protection from humidity to full water immersion

- Utilize proprietary technology
- Application equipment affordable and readily available
- Range of treatments available to meet performance, thickness, application and economic needs. From IPX3 to IPX8

Winner 2016 and 2019 Circuits Assembly New Product Introduction Award
1. Reduce Product returns due to water damage
2. Improve yields as rework is possible after coating
3. No or minimal masking required
4. Coatings are safe, non-toxic and can be used in factory environment
5. Affordable
The coating process depends on the treatment selected but could include:

- Spray
- Jet or Dispense
- Dip
NanoProof 7.0 performs well even at 18 Volts!
# 1 GLOBAL STENCIL NANOCOATING

Extremely thin flux-repellent film applied to stencil underside & aperture walls

1. **Improve Quality**
   - Higher yields
   - Better transfer effectiveness

2. **Boost Productivity**
   - Less underwiping
   - Less downtime for paper changes

3. **Reduce Costs**
   - Less rework
   - Lower paper and solvent consumption

Nanoclear is a SAMP Coating (Self-Assembling Monolayer Phosphonate)
I told my doctor I had **PD**
He prescribed NanoClear®

Symptoms of **PD** include – excessive rework, blocked apertures, misprints, bridging, slumping and low quality deposits.

[Click here for more info](#)

Got *Printing Dysfunction*? Try NanoClear®

Cheap. Simple. Works every time.

+1 858-350-9499
info@acuron.com
NANOCLEAR MEDIA COVERAGE
NANOCLEAR SUMMARY

#1 Globally

- Not just for fine pitch stencils
- Easy to calculate benefits:
  - Improved Quality
  - Boost productivity
  - Reduced Costs
- Coats the aperture walls
- Techniques to enhance durability – Soft wipes & clean better!
- Continue to innovate to meet customer demand

Nanoclear enables higher quality, more cost-effective stencil print process

Aculon, Inc. @ 2020
INTELLECTUAL PROPERTY & EXPERTISE

Strong combination of hard and soft IP:

- Granted over 35 Patents
- Developed many trade secrets
- Treated and tested thousands of applications
- UCSD Partnership gives access to millions of dollars of equipment
- Spent hundreds of thousands of hours solving surface problems
- Invested millions of dollars in building capabilities & expertise
Aculon is committed to offering a range of environmentally friendly products and follow good sustainable business practices. We help our customers support their sustainability goals and help protect the environment.

**VOC-Exempt Options**

**PFOA-Free Products**

**Eco-Packaging & Waste Reduction**
- Nearly all Aculon packaging (shippers, pails, bottles) is reusable or recyclable
- Green alternatives are utilized wherever possible
- From paper to pens, reusable or recyclable office supplies are used throughout our business operations

**Reduced Transportation-Related Emissions**
- Reduced material used → reduced transportation of material & wastes
- Localization with suppliers & distributors in Europe & Asia
- Utilize carbon-neutral shipping options when using UPS

**Sustainable Energy & Increased Efficiency**
- Retrofitted LED Lighting Throughout our HQ (>800 LEDs) & Utilize Extensive Natural Light
- Switched to Energy Efficient Equipment
CONCLUSION

• Platform technology company that make customers products better!
• Surface solution experts
• Strong history of working with customers to solve problems
• Broad portfolio of products, including more sustainable options
• Strong IP, testing capabilities and in-house expertise