



Protecting Electronics from the Deleterious Effects of Liquids and Other Contaminants at the Molecular Level

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HZO, Inc.
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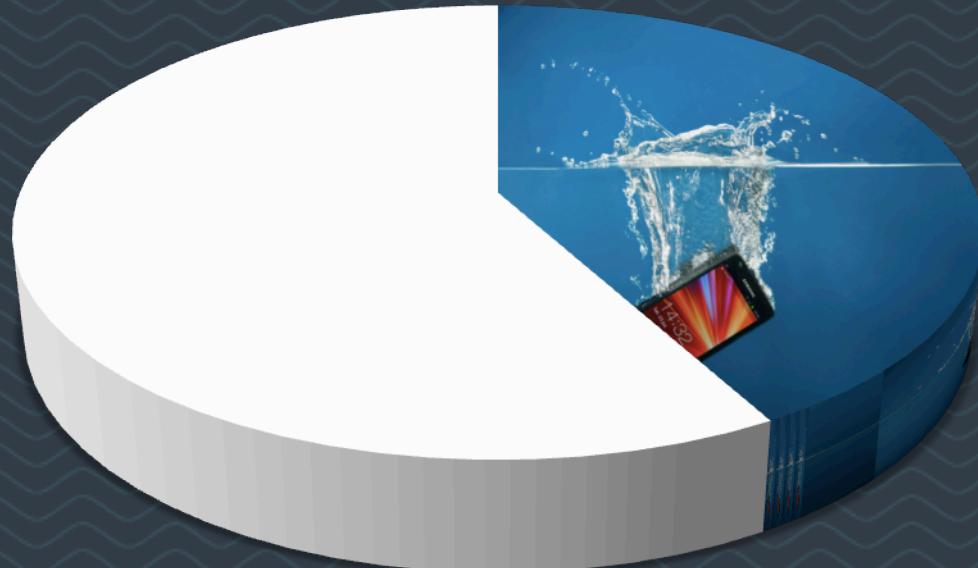
Overview



- Motivation
- About HZO
- Sample Products
- Coating Equipment
- Throughput and Chamber Capacity
- Temperature in Coating Chamber
- Comparison in Immersion Test
- Environmental Testing with 100% RH, Salt Fog, and Flowers of Sulfur
- Coated Battery Capacity after Repeated Immersions

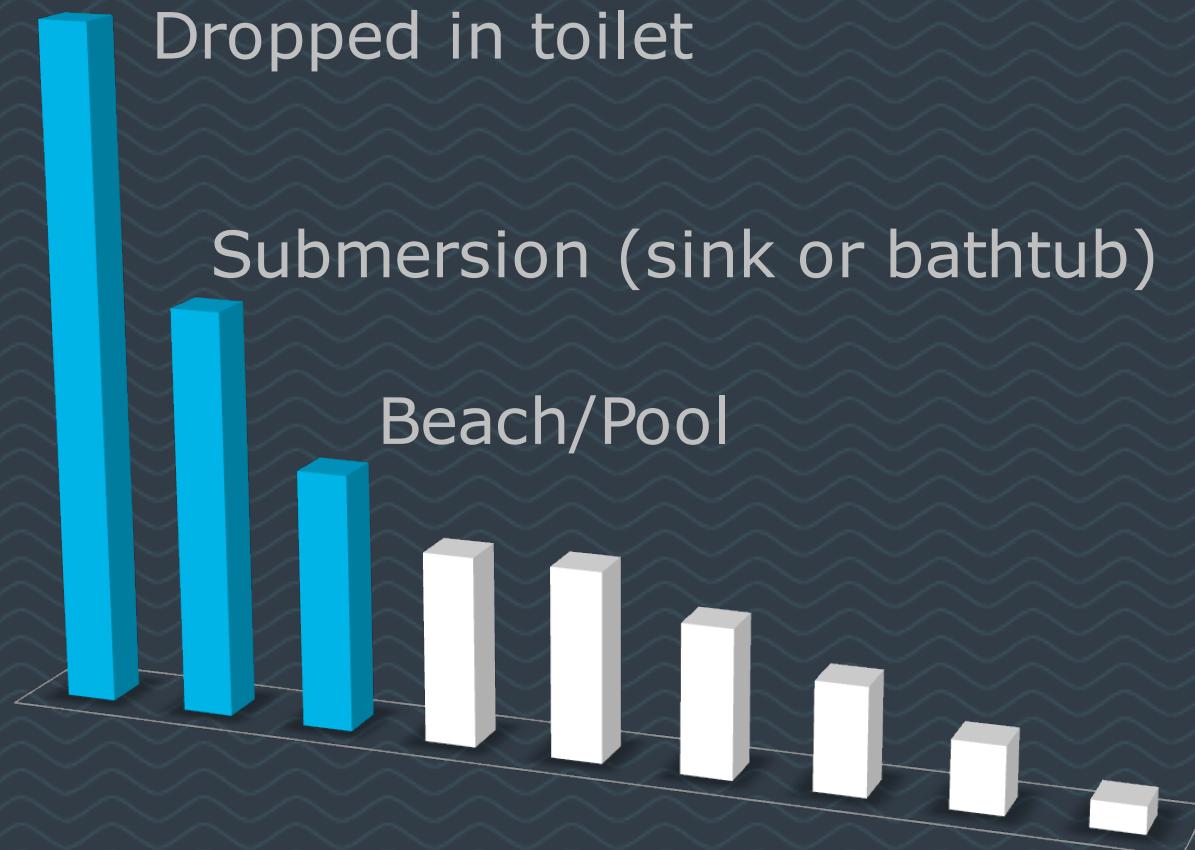
In a recent survey, 42% of respondents had experienced electronic device failure due to moisture.

– Commissioned University Study, May 2012



80% of those failures were submersion related

– Commissioned University Study, May 2012



Highly-Skilled Technical Team Able to Design Solutions by Product

Technical Expertise

- Thin Film Deposition & Characterization
- Materials & Surface Science
- Device Physics
- Vacuum Technology
- Polymer Chemistry
- Barrier and Hydrophobicity Expertise
- Corrosion Prevention

Technical Team

- > 100 Employees
- > 70% Technical Resources
- ~ 33% Bilingual employees
- 15 Languages spoken

167 Patent Filings with 5 Granted Worldwide

- Patent Portfolio in Equipment, Materials, Processes, and More



HZO® has been successfully implemented in the mass production of many consumer electronics products including:

- Smartphones
- Tablets & e-Readers
- Wearables



HZO Protected NavELite Compass

www.navelite.com



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USE YOUR COMPASS UNDER ALL CIRCUMSTANCES

WHEN SURVIVAL COUNTS

HZO Protected Tolino Vision 2

www.tolino.de/de/produkte/tolino-vision2/



tolino vision 2

Abgetaucht

Sie rannte so schnell sie konnte. Die riesige Uhr tickte unerbittlich. Als sie um die Ecke bog, hörte sie schon das Kreischen der Bremsen. Ein letzter großer Schritt, ein Sprung. Geschafft! Jetzt erstmal tief durchatmen. Mit der Fingerspitze berührte sie sanft seinen Rücken. Obwohl die U-Bahn vollgestopft war mit Menschen, reagierte er sofort. Wie immer reichte bereits diese winzige Bewegung von ihr aus, um nie gekannte Seiten in ihm hervorzurufen und in eine neue Welt mit ihm abzutauchen. Große Geschichten beginnen ab jetzt mit einem kleinen Fingertipp.

Zum Umblättern einfach nur kurz die Rückseite antippen – so leicht ist Lesen mit dem tolino vision 2.

1 / 12

Water Protection by HZO
Optimaler Schutz vor Wasser

tap2flip
Revolutionäres Blättern

Perfektes Schriftbild
Integrierte Beleuchtung

tolino vision 2

powered by T ..

HZO Sicher durch Nanocoating – funktioniert auch nach einem Sturz ins Wasser

Ultraflach und federleicht – handliche Maße: 163 x 114 x 8,1 mm

Offenes System – eBooks kaufen, wo man möchte (liest ePUB, PDF, TXT)

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CE 0560

Sample Products Currently in the Market featuring HZO

NavELite
Back-Lit Wrist Compass



ICEdot
Bicycle Crash Indicator



TAG Heuer
Luxury Smart Phone



Nike
FuelBand SE



LaiPac Tech
S911 Bracelet Locator



Live Free
Life Beacon Medical
Mobile Alert



BearTek
Outdoor Gloves



Digital Caddie
Samsung Galaxy Tab 2



Growing Global Footprint

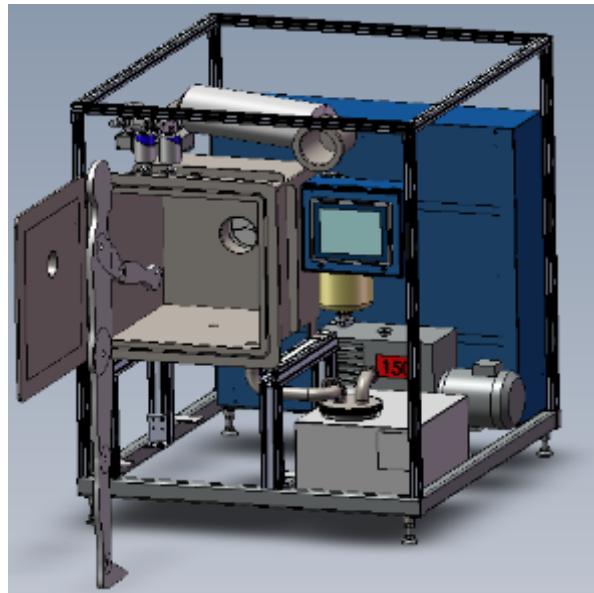


● = Offices

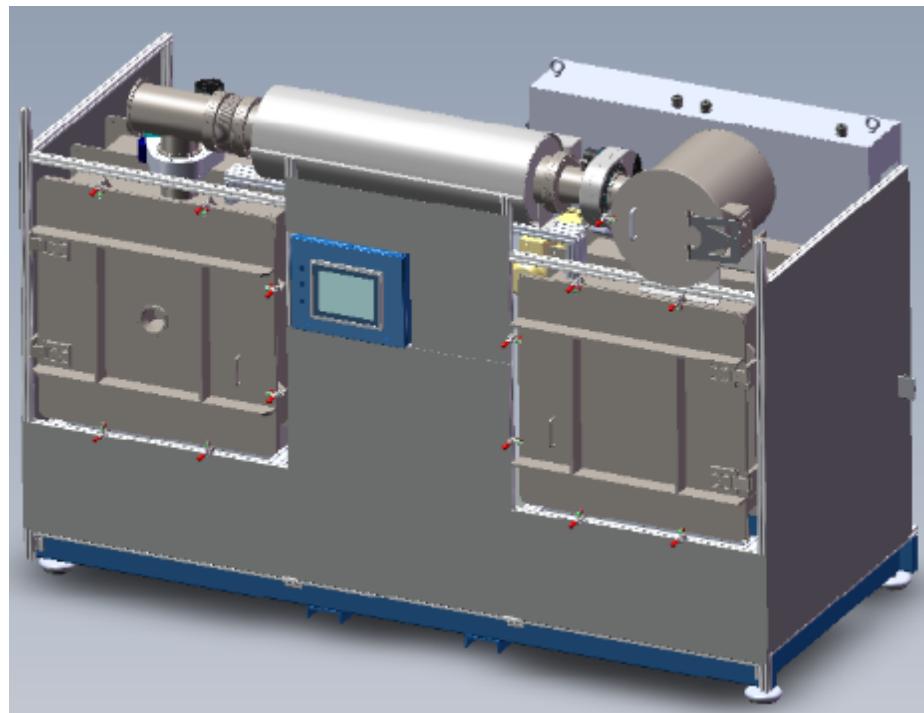
● = Installations

● = Deployments

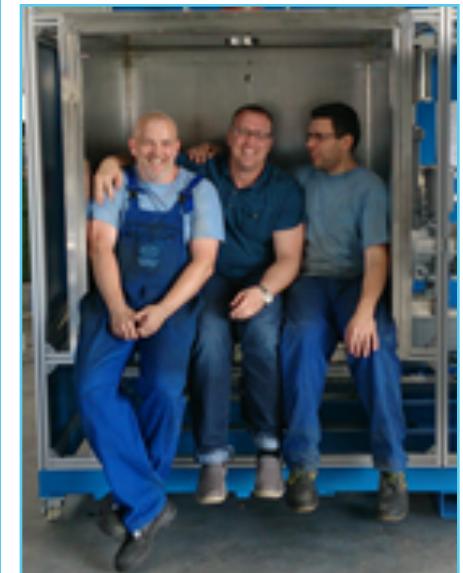
HZO2000



HZO5000



HZO10,000



- Capacity is 2x more than that of HZO5000

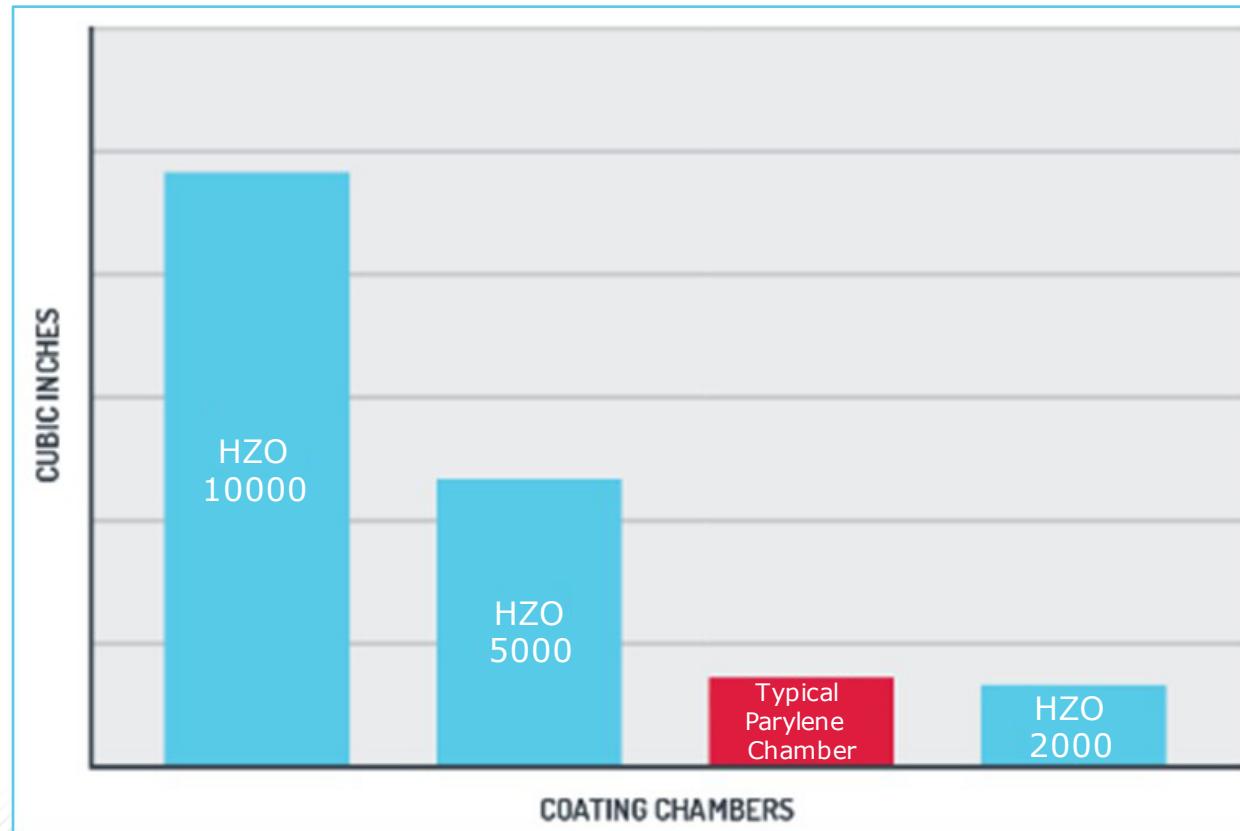
Chamber Capacity



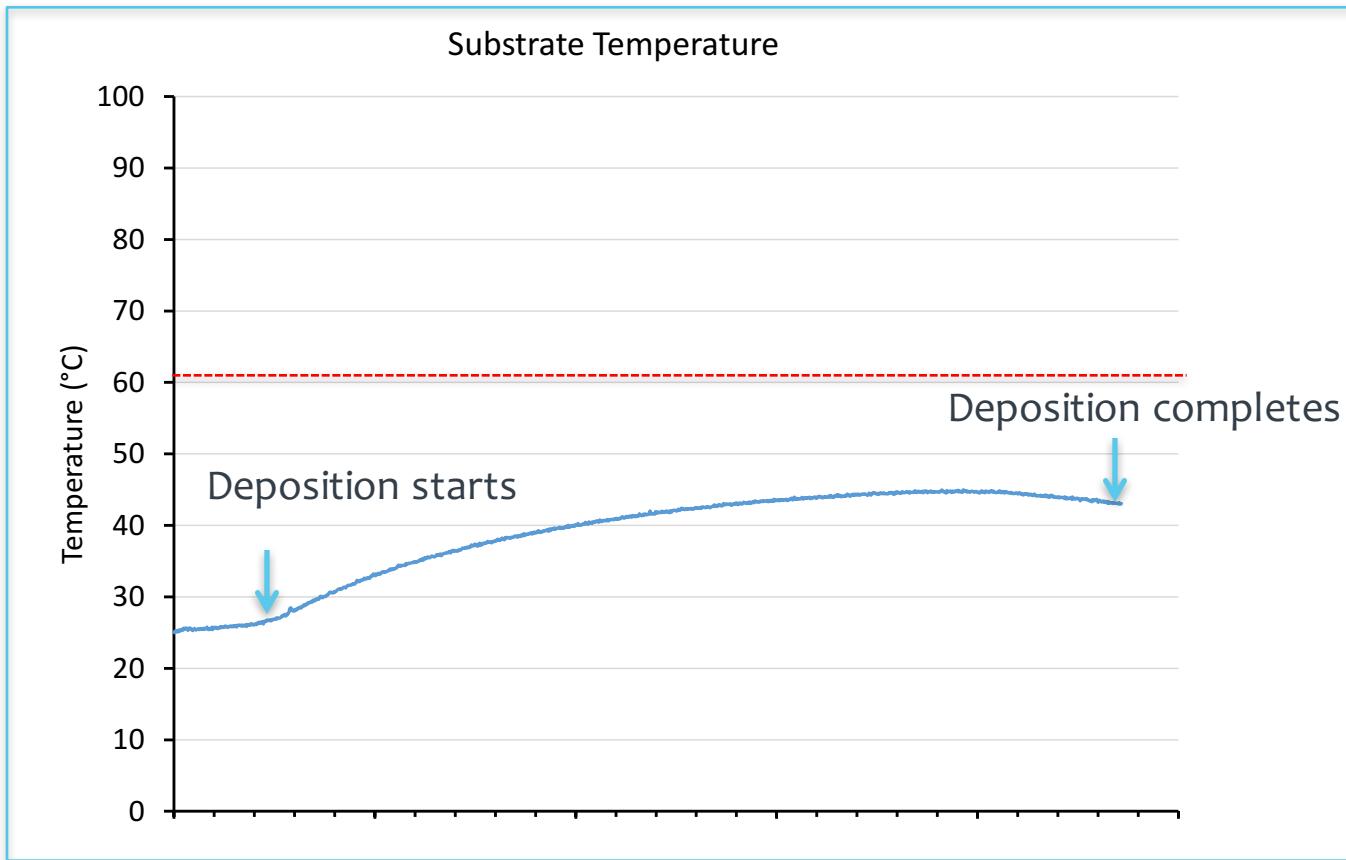
CHAMBER SIZE

Proprietary process utilizes the largest chamber size in the industry

- High throughput
- Minimal flow interruptions

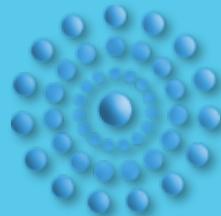


Low substrate temperature



- Substrate temperature stays below 45 °C

No
Protection



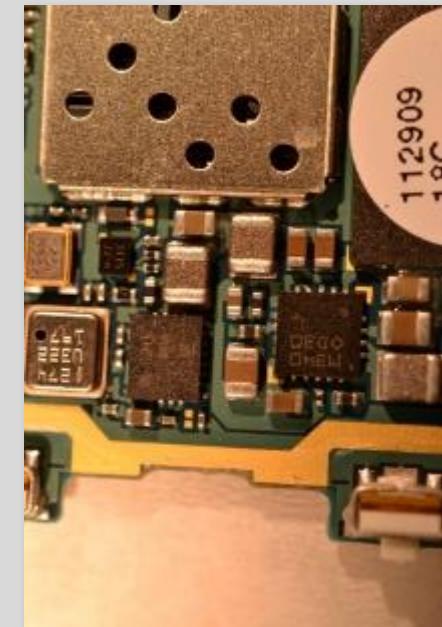
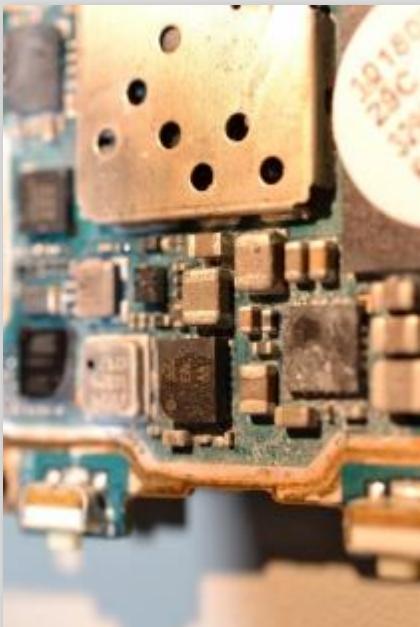
Spray
(Silicone)



Plasma
(Fluorinated Carbon)



HZO



Water Protection Competitive Comparison

5 Minutes Cycle Test*

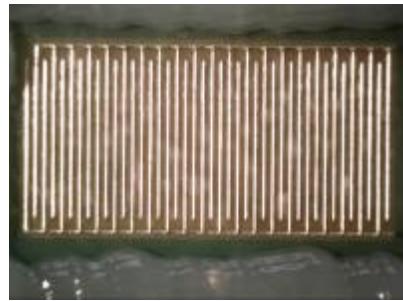
*2014 Cycle Test: 5 minutes total in dunk tank. At 2.5 minutes devices raised up near top (still submerged). Lowered back down for additional 2.5 minutes. Devices opened 1 week later with resulting corrosion.

HZO Environmental Testing

100% RH, 20 d

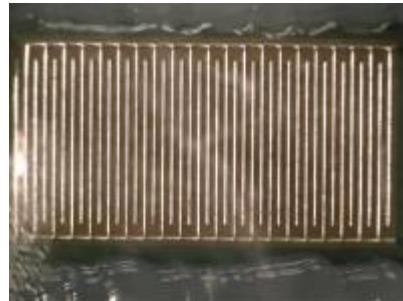


Day 0



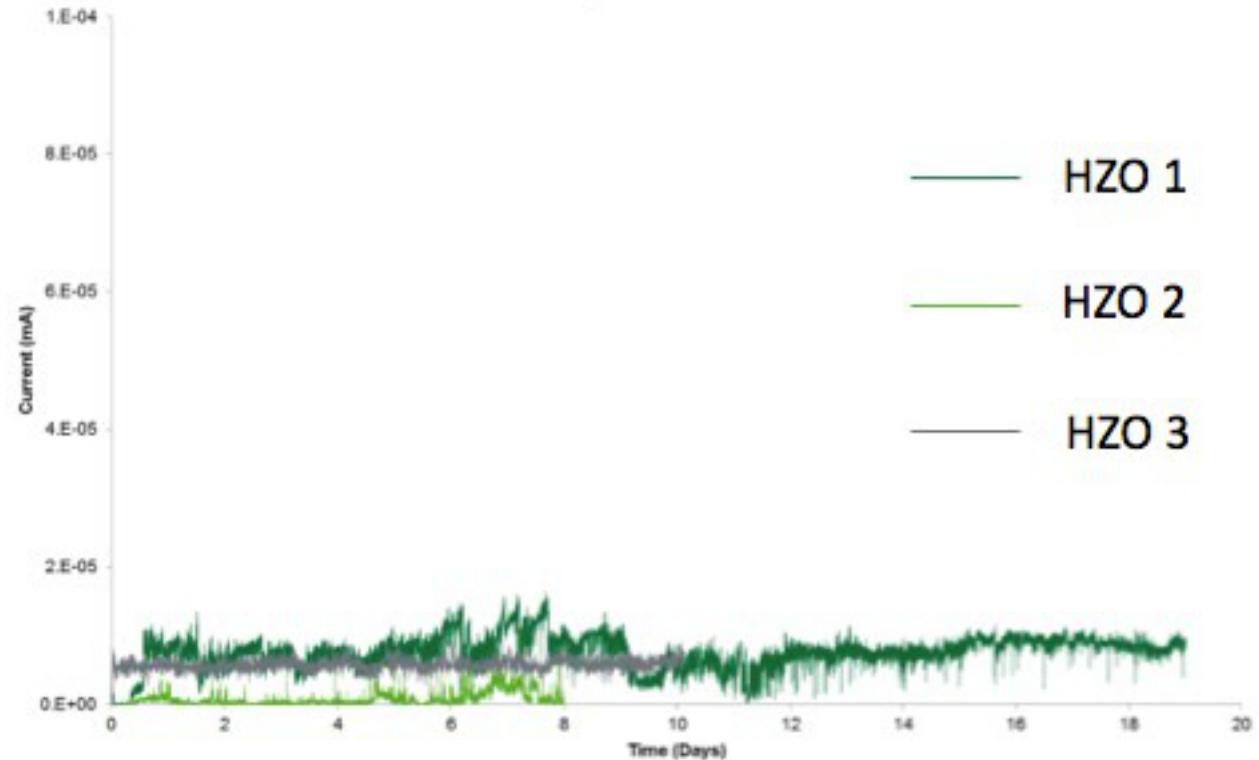
Subjected to:
100% RH
After 20 days of exposure, no corrosion or increase in leakage current occurred, so the experiment was stopped

Day 20



Corrosion Free

Coating on Clean Boards

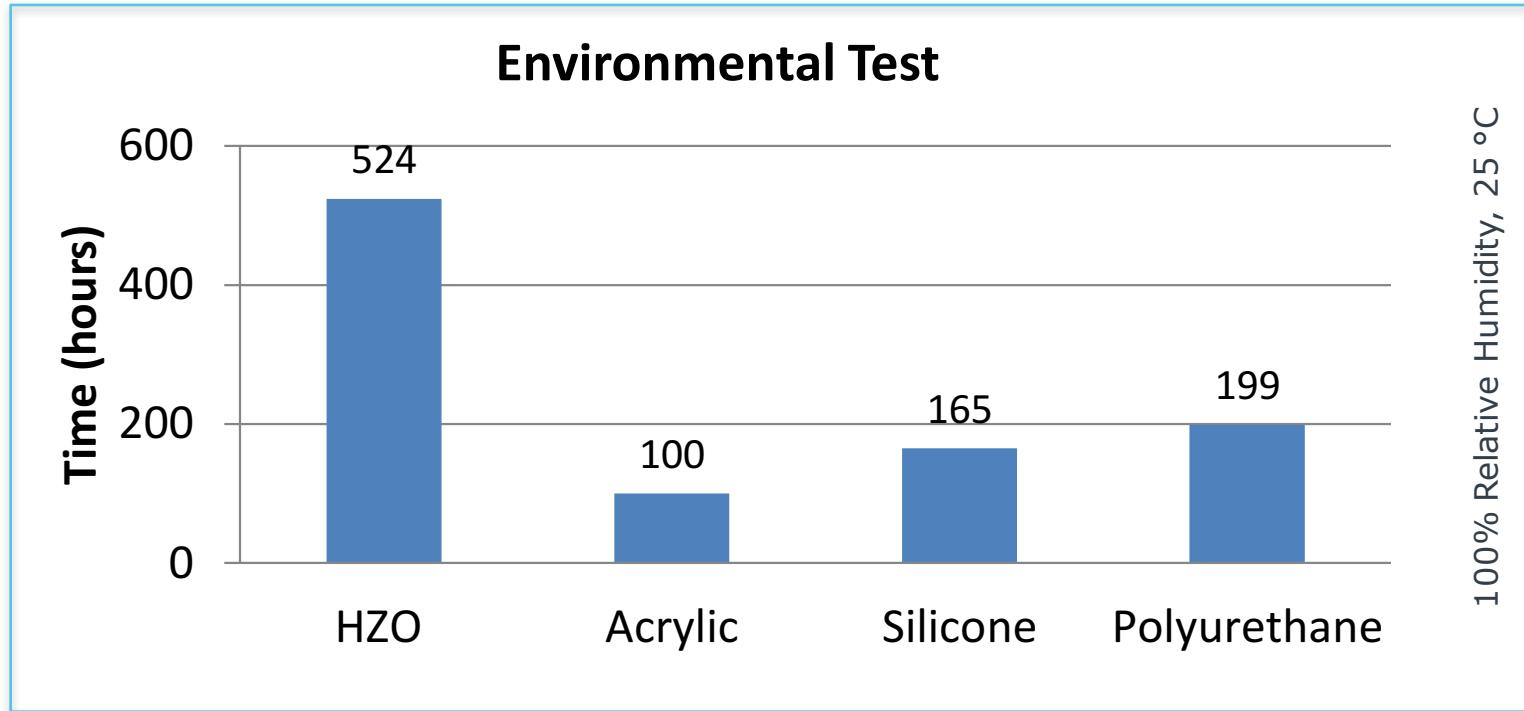


- ~5 mm layer of deionized water is applied on top of an SIR pattern, representing a 100% relative humidity at room temperature.

Source: 2013 IPU

HZO Environmental Testing (Cont.)

100% RH, 20 d



- Acrylics start showing corrosion after 100 hours
- Experiment concluded at over 500 hours: No evidence of corrosion observed for HZO

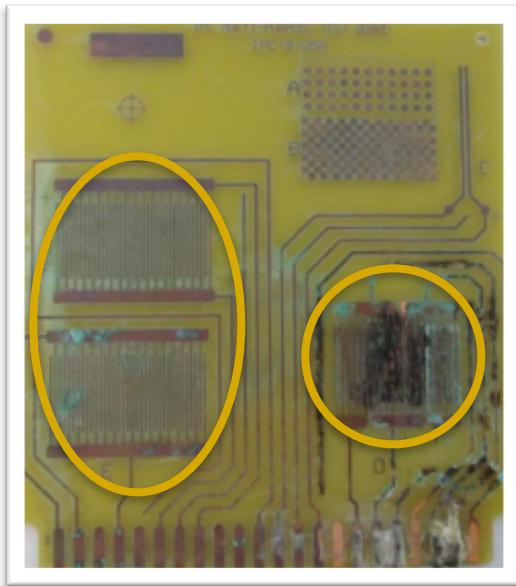
Source: 2013 IPU

Salt Fog Testing

35 °C, 5 wt. % NaCl, 168 h



Uncoated Board



- Positive control board showing massive corrosion

HZO Coated

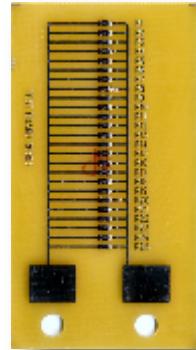


- Minor discoloration, but no corrosion

Source: 2014 Trace Labs

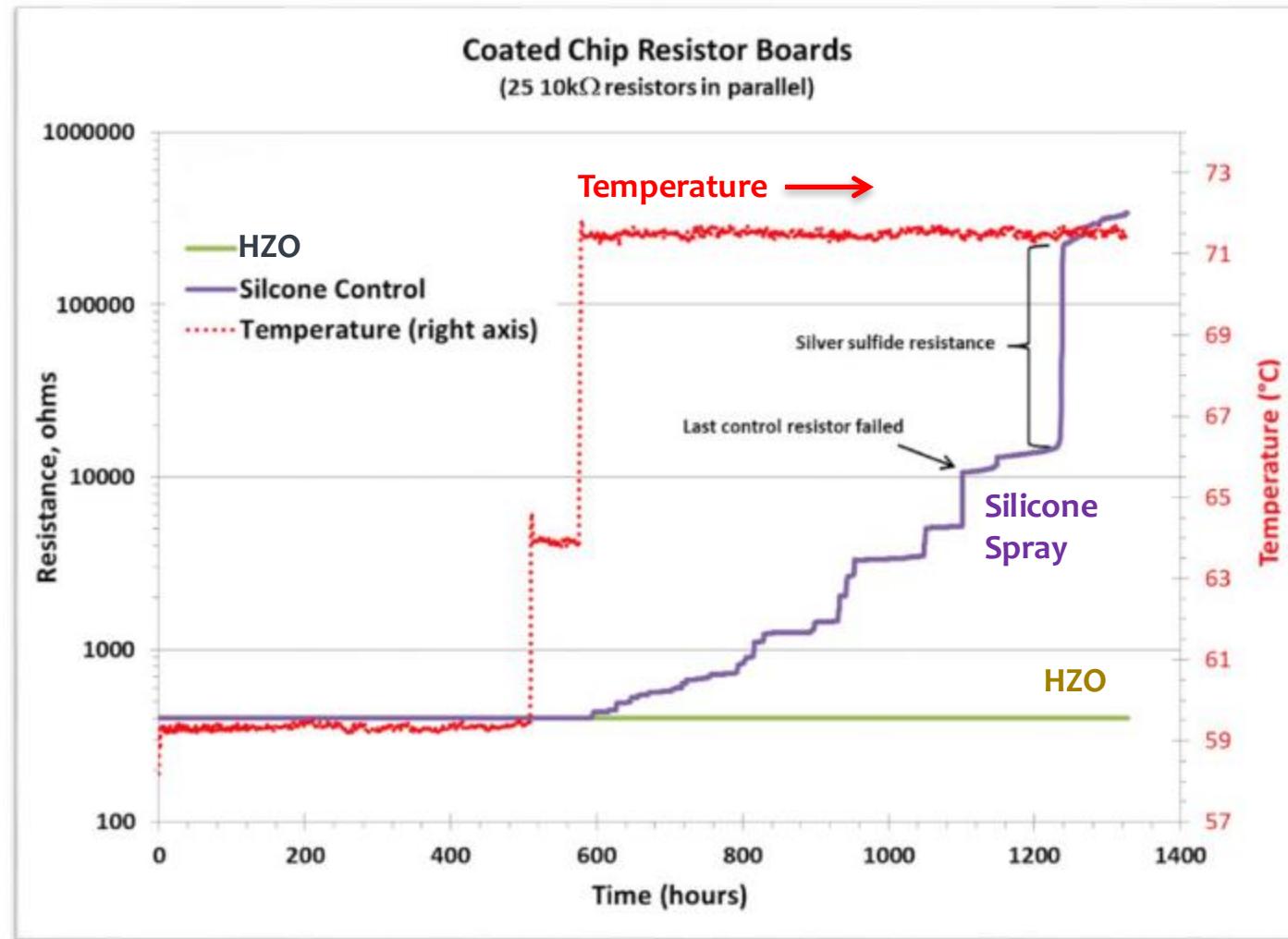
Sulfur Corrosion Testing

530 to 1500 ppb S₈ molecule concentration, 60 to 71 °C, 45 d



Coating Applied

Flowers-of-Sulfur (FoS) environment



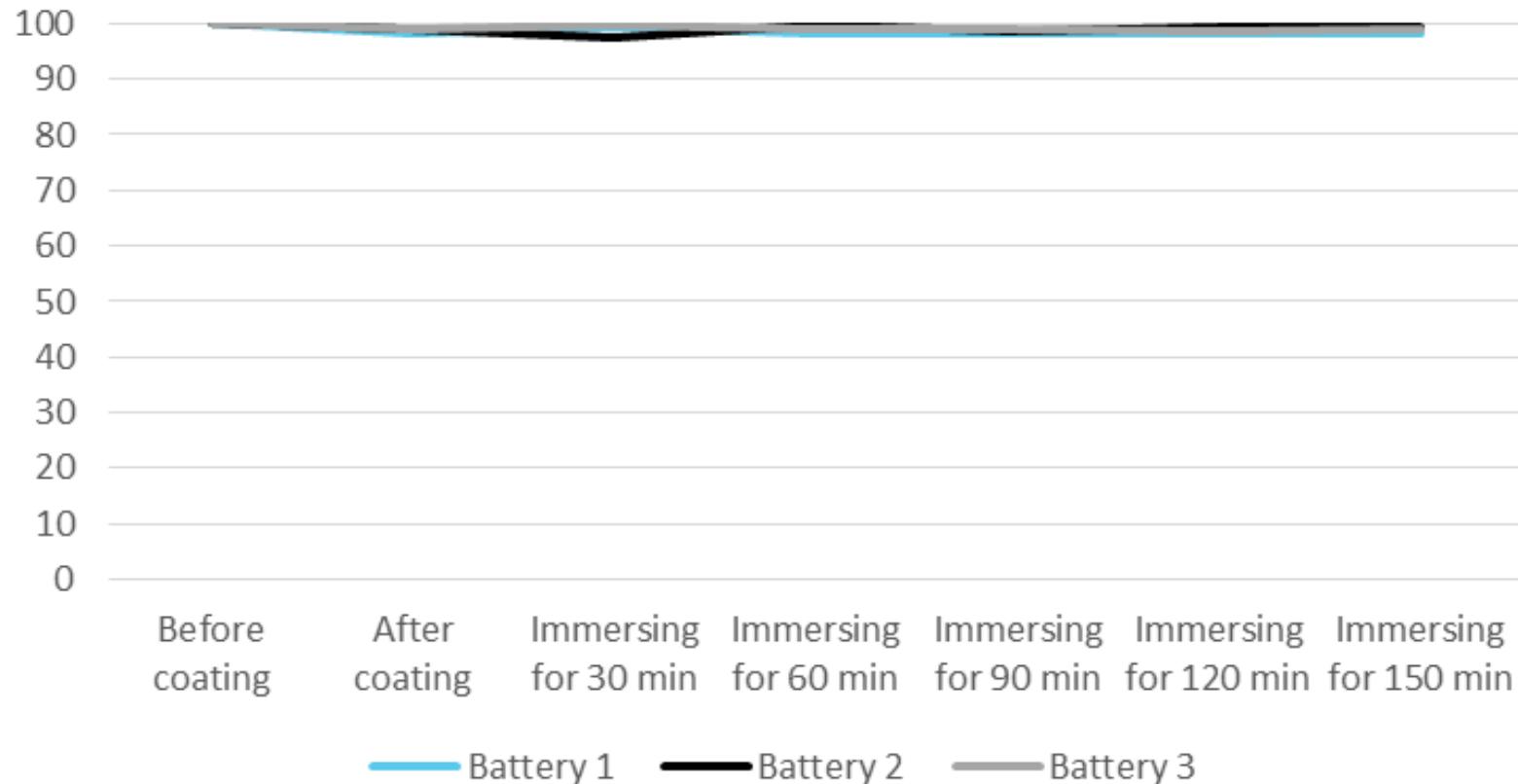
Source: 2014 Battelle

Coated Battery Performance

Capacity after Repeated Immersions



Percent Change in Battery Capacity



Source: 2014 H2O

Summary



- HZO coatings are deposited in a high-throughput chamber with a faster cycle time
- Substrate temperatures within the deposition chamber stay below 45 °C
- Environmental testing has shown excellent moisture and corrosion resistance
- Excellent results with immersion testing on a wide variety of devices
- Coated batteries have shown no significant effects from the deposition process and subsequent immersion