

Highest Resolution In-Line Inspection & Classification of Electrode Features

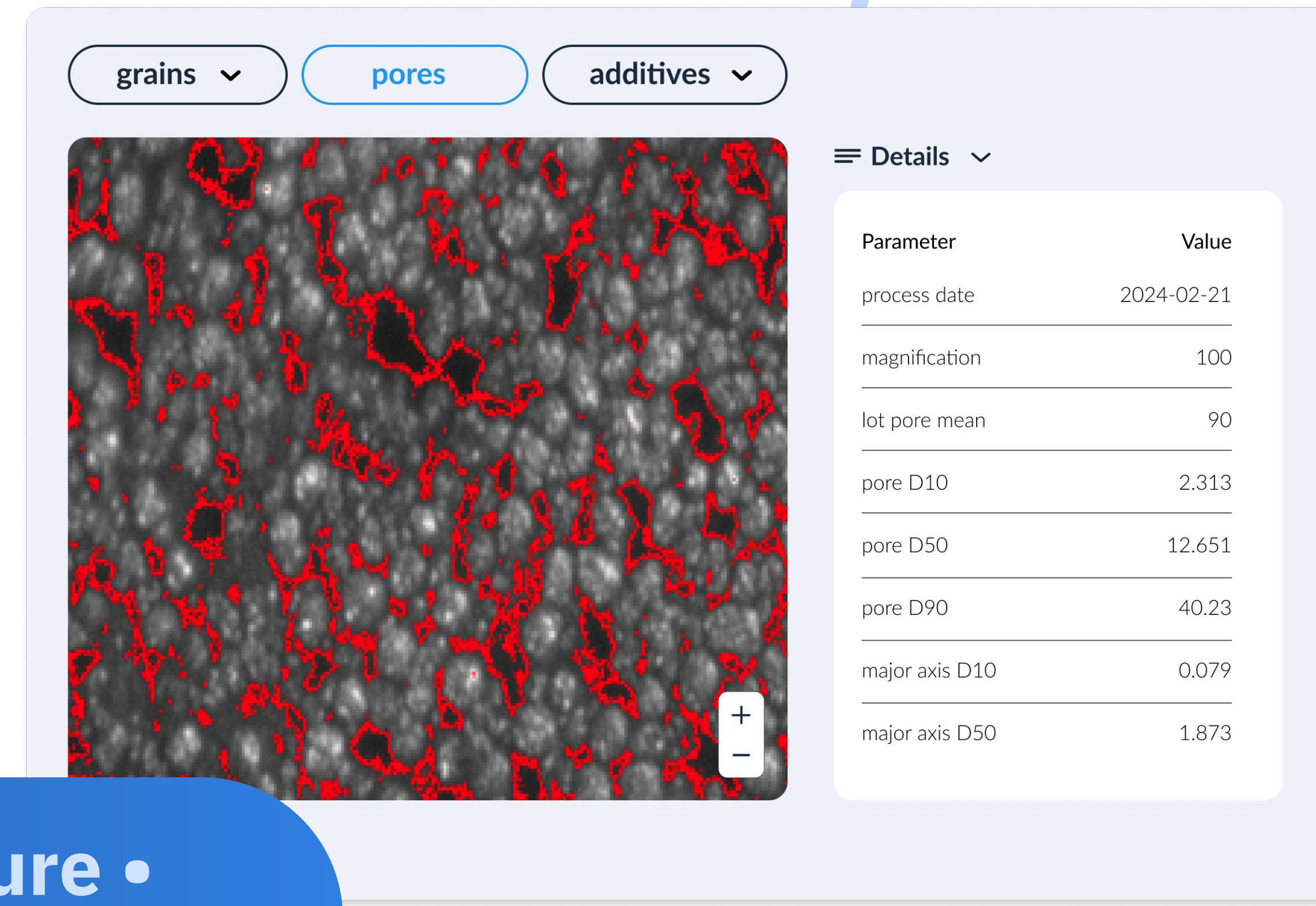
exensioTM
Battery

Optical Measurement Module

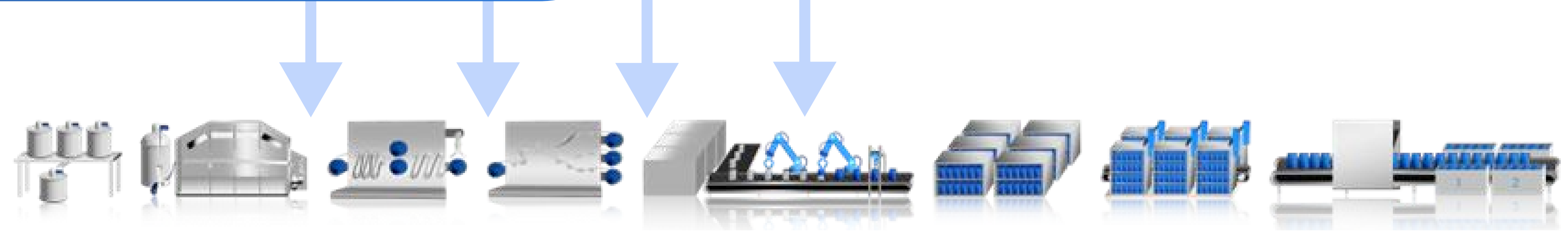
Predictive Electrode Quality Control

A vision system + AI inference engine equipped with micron-level inline inspection capabilities

The Optical Measurement Module (OMM) is an **AI-powered, high-resolution** optical imaging system designed to **revolutionize electrode quality control** in battery cell manufacturing. By shifting from reactive to **predictive inspection**, OMM enables manufacturers to reduce costs while improving product quality.



IDENTIFY MULTIPLE FEATURES WITHIN A SINGLE IMAGE surface texture • microstructure • organic & metallic particles • burrs +

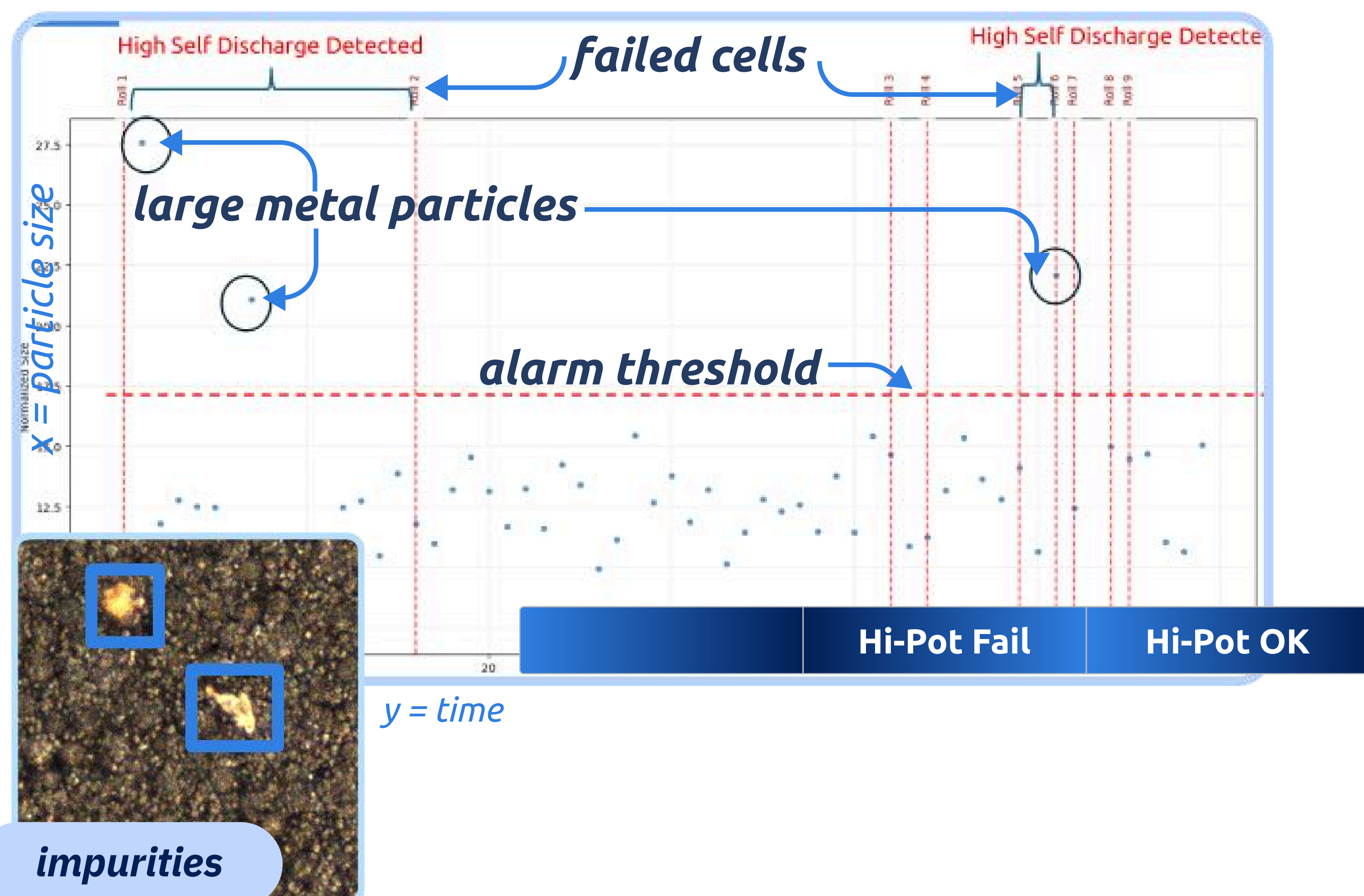


Key Features

- High-Resolution Imaging**
Detects microstructures, impurities, and surface textures down to 1 µm.
- AI-Driven Analysis**
Provides objective, real-time insights using machine learning and predictive algorithms.
- Real-Time Process Drift Detection**
Identifies impurities, surface texture anomalies, and process drift without prior process knowledge.
- Predictive Maintenance**
Correlates surface data with yield to detect equipment wear before it impacts production.
- Comprehensive Data Capture**
Covers extensive production periods, capturing all defect types.

Traditional vs. OMM System

	<i>Traditional</i>	PDF / SOLUTIONS®
Resolution	Low (50 micro-m)	High (1-3 micro-m)
Detection	Major flaws only	Microstructure, textures, impurities
Objectivity	Subjective	AI-driven
Analytics	Limited	Rich, real-time insights
Prevention	Reactive	Proactive



get actionable alarms and act right away through an MES or Label System connection

Impurity Detection in Cathode

Challenge: High hi-pot failure rate

OMM: Detected in-line organic/inorganic & metallic impurities, classified them by **type, size, & frequency**. Ingested **hi-pot data**.

Result: metallic particle density correlated to **hi-pot failures**. Alarm was set to alert manufacturer when metallic content surpasses a certain threshold.

Process Variability in Cathode Production

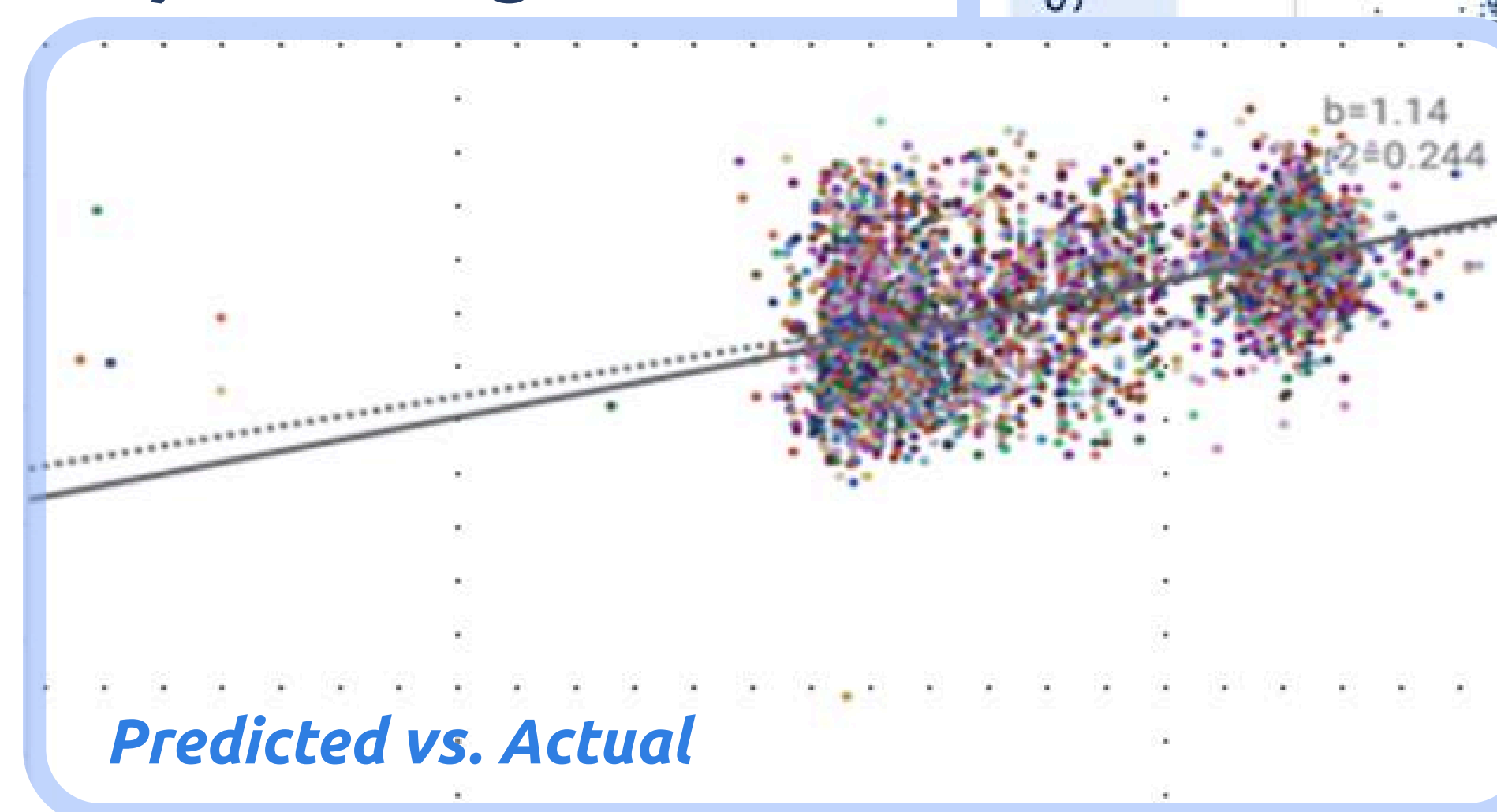
Challenge: Unexplained dips in cell yield.

OMM: Identified **surface texture anomalies** and correlated them with **self-discharge data**.

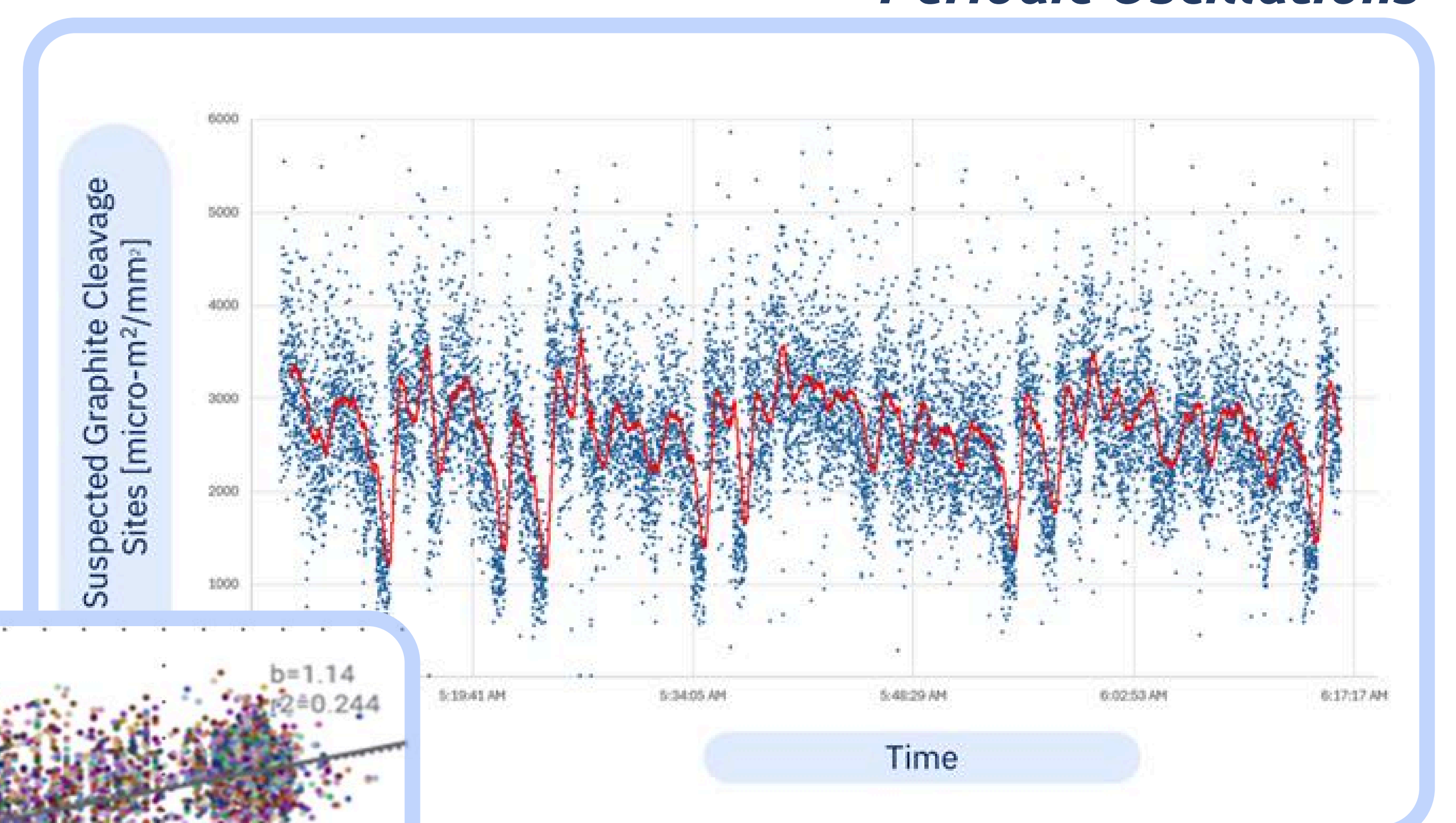
Result

Set objective **variability limits**.

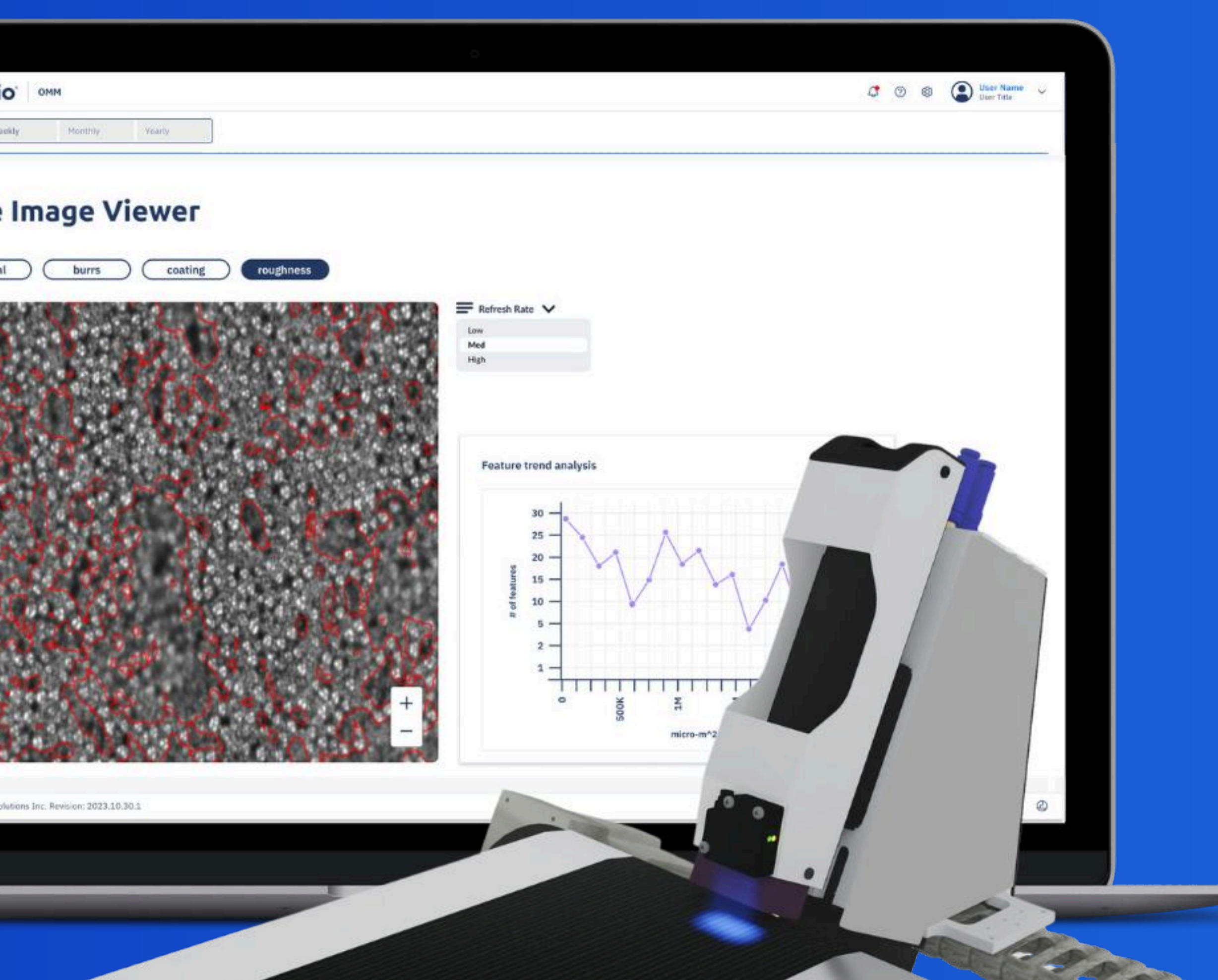
Correlation: K12 & Surface Roughness



Periodic Oscillations



identify process drift by seeing how your material texture changes over time



PDF / SOLUTIONS® ELECTRODE QUALITY MODULE

understand electrode quality in-line, live using our new Optical Measurement Module & Edge AI

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Solutions Highlights

- Detect **surface texture & impurities** in real-time
- Detect **process drift** with no prior process knowledge
- Correlate **surface data with yield** to detect equipment wear
- Actionable alarms** connected to MES or Labeling system

Contact Us



Corporate Headquarters
 PDF Solutions, Inc. 2858 De La Cruz
 Blvd Santa Clara, CA 95050 USA

www.pdf.com
 +1-408-280-7900