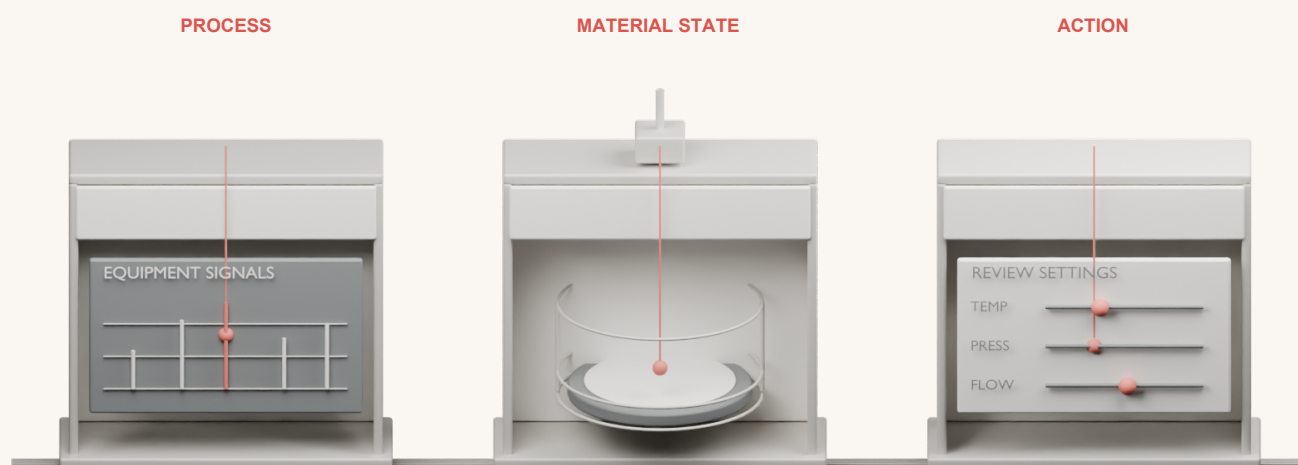


- MOLECULAR INTELLIGENCE FOR MATERIALS MANUFACTURING

See material failures before they form.

A lab-on-the-line approach to semiconductor manufacturing.
Connecting molecular behavior, process conditions, and product quality.



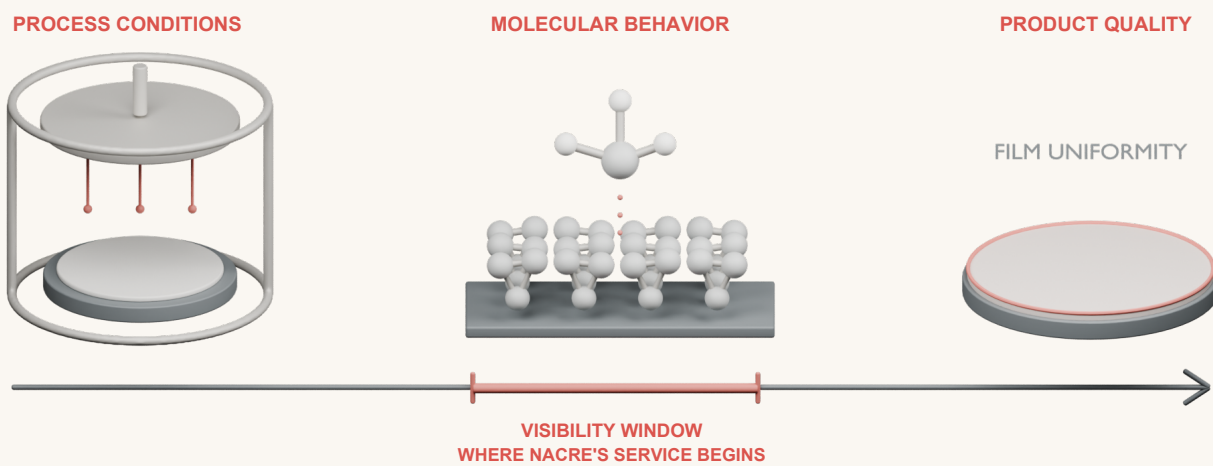
September 2026

• PROBLEM AND SOLUTION

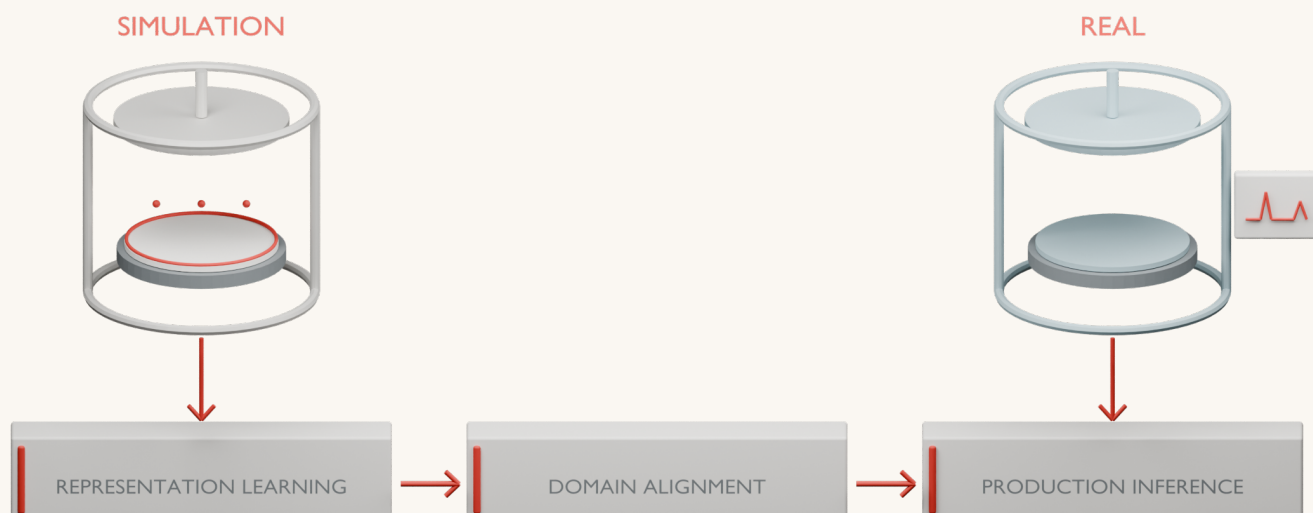
Manufacturing data tells you what happened.

Nacre helps you understand why it is happening and what happens next.

Nacre uses simulation to uncover the link between process conditions and material behavior, then validates that link with production signals and quality measurements.



A Lab-on-the-Line Solution



Our solution pairs simulated material states with secondary process signatures that production tools can measure. Representation learning captures that relationship in a simulated environment. Domain alignment adapts it to measured production signals and tests whether the relationship learned in simulation holds. Once validated for a specific process, the resulting indicator can flag emerging quality risk and help accelerate engineering review.

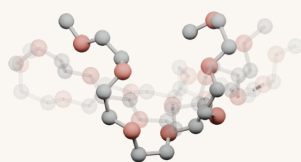
• TECHNOLOGY

Technology

Projecting molecular trajectories

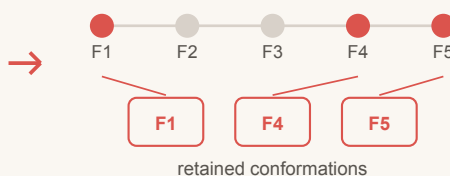
Nacre encodes atomic neighborhoods and large-molecule conformations from early molecular dynamics trajectories. A selective memory retains states that capture meaningful structural change while reducing redundant frames. A machine-learning model learns how those retained states relate to later molecular behavior, then uses that history to estimate subsequent configurations and engineering-relevant observables. These simulated trajectories can also support task-specific representation learning, linking simulated secondary process signatures to product-quality metrics calculated from the material state.

EARLY MD FRAMES



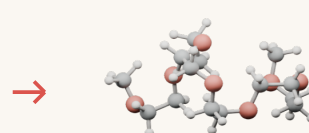
Early trajectory conformations

SELECTIVE MEMORY



retained conformations

PROJECTION TARGETS



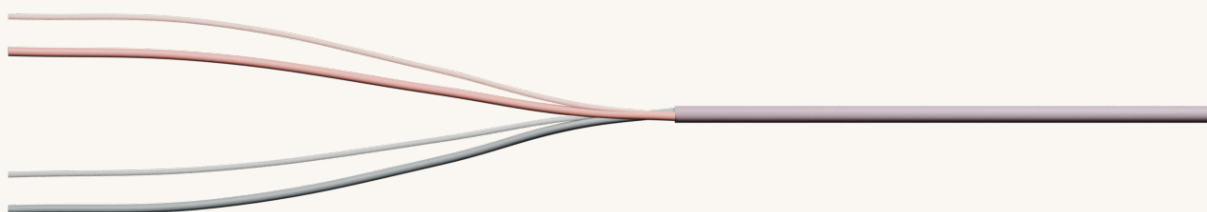
- Later configurations
- Engineering observables

Fusing simulation with production data

The fused latent model uses quality-aware optimal transport to align simulated and measured secondary process signatures in a shared space. The alignment and quality estimator are optimized together to preserve relationships relevant to product quality while accounting for differences between simulation and production. Available quality measurements calibrate and test the model for a specific process. Once validated, incoming signals can update an estimate of the relevant quality outcome as the process runs.

SIMULATED RELATIONSHIPS

FUSED LATENT MODEL



MEASURED PRODUCTION DATA

DOMAIN ALIGNMENT

ESTIMATED QUALITY RESULTS

- WORKFLOW

From molecular behavior to manufacturing decisions.

01 / INPUT

Define your problem

Material chemistry, production conditions, available process signals, and quality measurements.

02 / SIMULATE

Construct a simulated environment

Models tailored to the material system map behavior under candidate conditions.

03 / INTERPRET

Material and process intelligence

Simulation-derived indicators connect to production conditions and an operating window.

04 / PREDICT

Risk prediction and optimization

Validated models surface drift, pass/fail risk, and opportunities to improve settings.

05 / DECIDE

Production decisions

Engineering teams review scientific context before testing or changing a process.

Not another factory dashboard.

Nacre adds **molecular understanding** behind the production signals.

- HOW ENGAGEMENT WORKS

Tell us about your manufacturing problem.

-
- | | | |
|---|-----------------------------|----------|
| 01 | Technical diagnostic | 1–2 days |
| Understand the material, production challenge, data, and desired outcome. | | |
-
- | | | |
|--|---------------------------------------|-------|
| 02 | Model and database development | Study |
| Build and evaluate a customer-specific molecular simulation framework. | | |
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- | | | |
|--|-------------------|------------------|
| 03 | Validation | Process-specific |
| Compare model output with observations and define useful process indicators. | | |
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- | | | |
|--|------------------------------|------------------|
| 04 | Production deployment | After validation |
| Integrate validated intelligence into the production workflow. | | |
-
- | | | |
|--|--------------------------------|---------|
| 05 | Continuous intelligence | Ongoing |
| Monitor quality stability, process drift, and risk as conditions evolve. | | |
-

**What material problem is costing your production line?
Evaluate it with Nacre.**

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nacre

Nacre Systems Inc.