



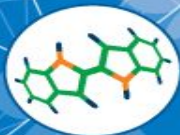
mission. critical. chemistry.

Management of Change

A View from the 2nd Row

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- ▶ **SACHEM market position**
- ▶ **MOC challenges for sub-suppliers**
 - ◆ **Where and when**
 - ◆ **Managing MOC**
 - ◆ **New and emerging MOC challenges**
- ▶ **Summary**



“SACHEM is a global chemical science company specializing in extremely pure, precise, and innovative chemistry products and services critical to our customers’ manufacturing processes”

SACHEM has established leading positions in key growth markets through technical expertise, exceptional service, and an unwavering commitment to safety and the environment.

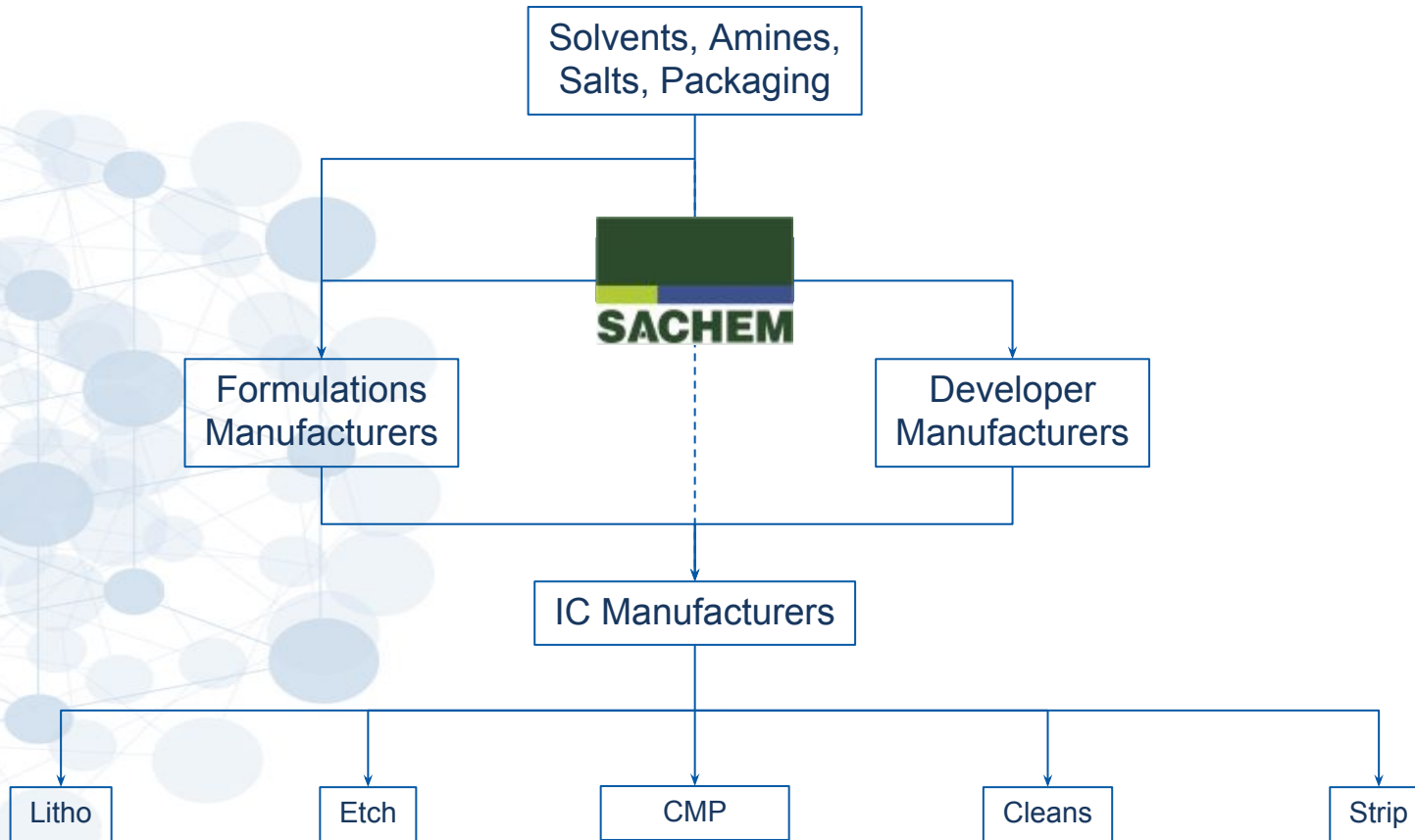
Electronic Materials (IC, Flat Panel, PWB)

Energy Materials (Electrolytes, Oilfield)

Structured Materials (Zeolites, Emission Catalysts)

Specialty Materials (Ag Chem, Personal Care, Pharma, others)

SACHEM in Electronics: Supplier and Sub-Supplier



Where Does MOC Begin?



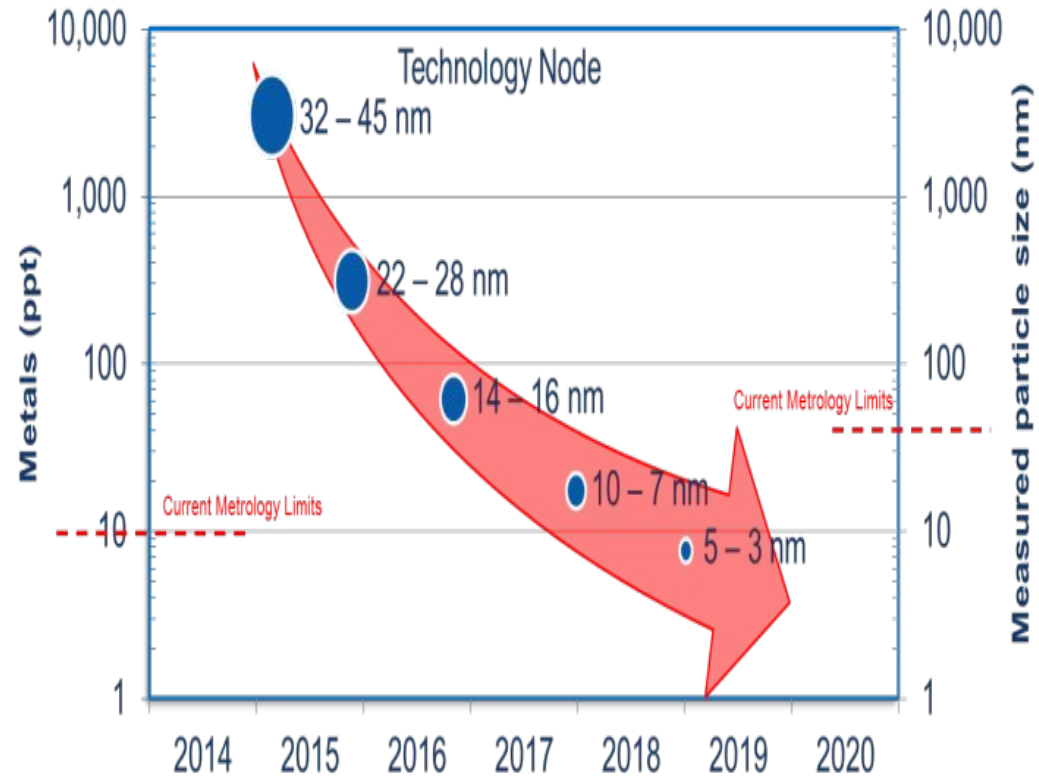
- Strong value in moving MOC upstream
- Reduced upstream variation cascades to improved performance in the fab
- Supplier motivation generally decreases proportionally to “distance” from fab
 - Multi-market suppliers
 - Small semiconductor volumes
- SACHEM: the buck stops here

When Does MOC Begin?

- Research, development, scale-up, commercialization becoming increasingly parallel activities
- Formulators requiring purity, process stability, supply chain maturity from initial development
- Front-loads cost in new product development process
- Decreases R&D flexibility, slows cadence of product development and optimization

Improve My Products, But No PCNs!

25% TMAH Quality Roadmap



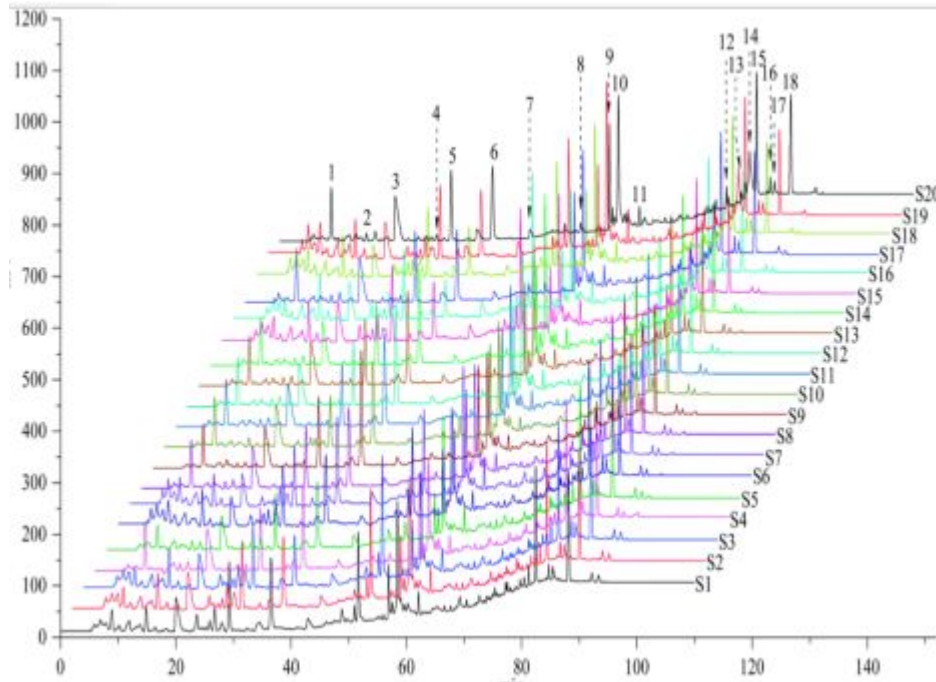
- The roadmap remains the roadmap
- Same products, new requirements, tighter control limits
- Increased requirements on incoming raw materials, process control, purification, filtration, packaging, all of which can fall under MOC
- Reaching and surpassing metrology limits, creating new challenges in MOC compliance

Everything is a “Level A” Process Change?

Area	Type of Change	Level of Change		
		A	B	C
A. Raw Materials	A1. New raw material	X		
	A2. New raw material manufacturer not previously qualified	X		
	A3. New SACHEM raw material specification	X		
	A4. Raw materials control limit			X
	A5. Manufacturing process of raw material			X
	A6. Raw material acceptance method			X
B. Manufacturing	B1. Manufacturing process flow	X		
	B2. New manufacturing location	X		
	B3. Manufacturing equipment (i.e., remodeling, movement within same location, installation of additional equipment or capability with "in kind" construction)		X	
	B4. Process control method (eliminate monitor, add monitor)		X	
	B5. Manufacturing condition or target (i.e., temperature, time)			X
	B6. Frequency of routine in-process sampling/testing			X
	B7. Type or grade of consumables (i.e., filter)		X	
	B8. Modification of existing piping with no new wetted materials or process steps			X
	B9. Inventory method			X
	B10. Minor change to manufacturing procedure			X
C. Inspection	C1. Inspection or testing method	X		
	C2. Inspection instrument	X		
	C3. Product specification, control limit or CoFA format	X		
	C4. Instrument control method		X	
	C5. Duplicate instrument of like kind		X	
	C6. Frequency that a standard is run or equipment check performed			X
	C7. Modification of inspection procedure			X
D. Packaging	D1. Container size	X		
	D2. Container manufacturer not previously qualified	X		
	D3. Part size (i.e., diptube length, connection fitting)	X		
	D4. Container wetted surface (package, gasket, cap)	X		
	D5. Container label, packing, safety label,		X	
	D6. MSDS change		X	
E. Transportation or Storage	E1. Transportation Method		X	
	E2. Recommended storage and shipping conditions or tracking		X	
F. Other changes	F1. Specific customer approval requirement	X		
	F2. Specific customer notification requirement		X	
	F3. New toxicological information that may affect health or safety characteristics associated with the product.		X	
	F4. Change in ownership or name		X	
	F5. New environmental data that suggests changes in environmental risk factors		X	
	F6. Regulatory change that would require notification		X	

- Criteria for categorizing change
- “Grade Inflation” - the inevitable shift to the left
- Lengthening notification period

Fingerprinting – The Unknown Unknowns



- A relative newcomer to the MOC process
- Increasing requests for product fingerprinting to evaluate “unknown unknowns”
- No fixed definition, no standard metrology
- Creates potential Intellectual Property concerns
- Raw material, manufacturing, and purification IP can be compromised through evaluation of fingerprinting data

Predicting Change – The Change Horizon



- MOC necessarily involves notification period
- Change horizon adds new dimension of notification period in front of the notification period
- Driving change in raw materials manufacturing ecosystem
 - Changing mentality from “pounds out the door” to customer fulfillment
- Short-term cost, long-term benefit

New Regulations for New Products



- Dynamic regulation landscape hitting semiconductor supply chain hard
- Challenging ROI on new product development
- Uncertain timelines from lab to formulation to fab
- Global harmonization of regulations neither global nor harmonized

The Golden Rule(s)

- ▶ **It's ALL about understanding and reducing variation**
 - ◆ Specs are out
- ▶ **Management of Change benefits the entire supply chain**
 - ◆ It helps suppliers, not just customers
- ▶ **Transparency is key, needs to be a 2-way street**
 - ◆ Supplier to customer, customer to supplier
 - ◆ If it's not IP, show it
- ▶ **It's a Process Change Notification, not a Process Improvement Notification**
 - ◆ Prove it's not a change, not that it is one
- ▶ **Develop a root cause analysis mentality**
 - ◆ Every OOC event has one
 - ◆ Look for the “why,” not just the “what”

Acknowledgements

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Questions?

