CMC Fabs 2016 PLANNING Critical Materials Council for Semiconductor Fabricators MEETING

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Outline

- CMC Fabs Organization Update
 - Membership Sign-up
 - Member Guidelines & Security Measures
 - Website
 - Seminar
- Schedule for the coming year
 - Monthly Meetings 2nd Tuesday of every month?
 - Face:Face May 3-6 and October
 - Surveys 2/year (March and Sept.)
- May Face to Face Meeting Focus / Objectives (may likely take 2 meetings to complete)
 - Informal Survey Results
 - Monkey Survey

CMC Fabs Organization / Update

for Sematech CMC Members

Council Mission/Goals

- Identify issues surrounding the supply, availability, accessibility, or lack thereof, of semiconductor process materials, current and emerging "Critical Materials".
- Collectively work towards anticipating, and solving these issues, in a non-competitive environment. i.e. identifying and alleviating supply problems, best practices, big data, standards, etc.
- Support the Continuous improvements of the Material Supply Chain Community of Semiconductor Fabricators.



Meetings Format and Attendees

Council Attendees:

- Senior Materials Procurement Managers
- Material suppliers, sub-suppliers and invited expert speakers

Meetings Operation:

- Two (3-4 day) face-to-face (F2F) meetings per year in conjunction with CMC Seminar, or other semiconductor device related event, at Member Company sites when possible. Each face:face meeting will cover
 - Two selected material topics / technology area are selected as the focus for member share, with 3-4 suppliers presentation per topic
 - 2 days of closed door meetings
 - ✓ Selected material topics
 - √ 1:1 session among members-suppliers, as needed.
 - 1.5 day Materials Seminar with selected industry experts (IDMs, OEMs, material suppliers), open to Members and Paying Attendees.
- A monthly Conference meeting
 - Critical Material Reports Updates
 - Benchmarking and Mini-Surveys
 - Planning / Prep for F2F Meeting
- Additional meetings during Supply chain issues and disasters, as needed.



2015 → 2016 CMC Membership Plans

















CMC Meeting Security Measures

- Blind Survey Procedures
 - Double Blind
 - Single Blind
- Anti-Trust Laws Reminder
- CMC Guidelines
- Disclosure / Presentation Agreement Form (same as Sematech CMC)
- www.CMCFabs.org Website Portal

Double Blind Survey Procedure



CMC DOUBLE BLIND SURVEY PROCEDURE

1.0 SCOPE:

This procedure outlines the method to be used to carry out pricing surveys or surveys of other similar sensitive information using inputs from independent companies which may be considered competitors or potential competitors. This procedure is in place for the purpose of ensuring compliance with US and International Anti-trust laws. This procedure will be used by the Critical Materials Council (CMC), under the management of TECHCET CA LLC.

2.0 PROCEDURE:

- 2.1 Survey Generation.
 - 1.1.1 Survey is to be generated by a Critical Materials Council (CMC) Member or CMC Facilitator.
 - 1.1.2 Excel spreadsheet or similar format is to be used.
 - 1.1.3 Survey is password protected, the password is shared only among the CMC members and CMC Facilitator.
- 2.2 Survey Submission to CMC Members.
 - 2.2.1 Survey is emailed to the CMC Members by the CMC Facilitator to each member with instructions to send the survey responses to a separate party

CMC Anti-Trust Reminder

- CMC Fabs activities are a coordinated effort among competitors in the semiconductor device fabrication industry and are, therefore, subject to antitrust laws.
 - Although this coordination is perfectly legal under U.S. antitrust laws, we want to make sure that no antitrust risks are raised by the manner in which the CMC Fabs program is carried out. Accordingly, these guidelines may go somewhat beyond the prohibitions of the law, but that is done in the interest of safety.
- The penalties for violating antitrust laws are quite severe, including large fines and even imprisonment of individuals found guilty of illegal conduct.
 - Contrary to the popular belief that the government has relaxed antitrust enforcement, in recent years the Justice Department has recommended jail sentences for the majority of persons convicted of violating antitrust laws. Moreover, the U.S. Supreme Court has ruled that a trade association may be held legally responsible for the unauthorized, as well as authorized, acts of its members. Accordingly, every effort must be made to avoid even the appearance of impropriety.

CMC Fabs Guidelines

General Council Ground Rules:

- Councils are 'participation-based', willingness to contribute is expected.
- Councils use 'Give to Get' for member shares and surveys. 'Give to Get' means a company has to
 provide data in order to see and receive other member's data.
- Members are expected to contribute presentations and survey material in detail and quality consistent with the Council's expectations.
- Format of survey results can be anonymous, 'double blind', or with company identities revealed as decided by the Council.
- In addition to face-to-face meeting events, teleconferences or WebEx planning sessions will be used to
 organize and identify Council activities and schedules; participation is encouraged.
- The WebEx participation option will be available for each Council meeting unless otherwise stated.
- Councils will make reasonable efforts to accommodate different time zones and schedules for teleconferences or WebEx.
- Councils decide activities by consensus, or if necessary by majority vote.
- · All Council activities comply with TECHCET confidentiality obligations.
- · All meetings will be conducted in English, unless specified by the Council.

TECHCET Confidentiality Classification and Consent to Disclose to CMC Participants

In representing my company,, at this CMC Meeting, this presentation and its contained information is to be considered as:
Please check one of the following:
Techcet CMC Member Company Confidential (Techcet CMC member company, Give to Get* Rules apply): If you check this box and type your name below, you are agreeing that this presentation may be shared with the Techcet CMC Member Companies, the CMC activity participants and the Supplier(s) associated with this CMC meeting.
Individual Company Confidential (non-Techcet CMC member company): If you check this box and type your name below, you are agreeing that this presentation may be shared with the Techcet CMC Member Companies, the CMC activity participants and the Supplier(s) associated with this CMC meeting.
Techcet Confidential (Techcet CMC member company, Give to Get* does not apply): If you check this box and type your name below, you are agreeing to transferring the ownership of this document and the information contained herein to Techcet. Techcet personnel can disclose Techcet Confidential information to third parties if it furthers our interests and there is a confidentiality agreement in place with the receiving party.
Non Confidential: If you check this box and type your name below, you are agreeing that this information can be shared as public information and have no restrictions to its distribution.
*Give to Get - A term used by Techcet to define how confidential information is distributed in Techcet activities where the members learn from each other by sharing member company data and intellectual property. "Give to Get" means a company has to provide data in order to see and receive other members data
Author Name: Date:
Signature:

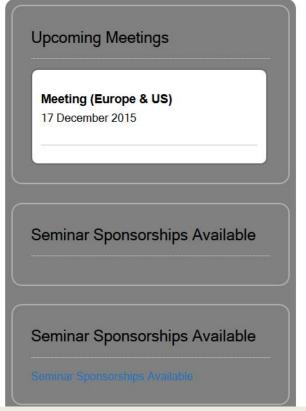
CMC Fabs Website:



CMC Fabs, the Critical Materials Council for Semiconductor Device Fabricators, was originally established by ISMI/Sematech in early 1990's. The Council works to identify and remediate issues impacting the supply, availability, and accessibility of semiconductor process materials, current and emerging - "Critical Materials".

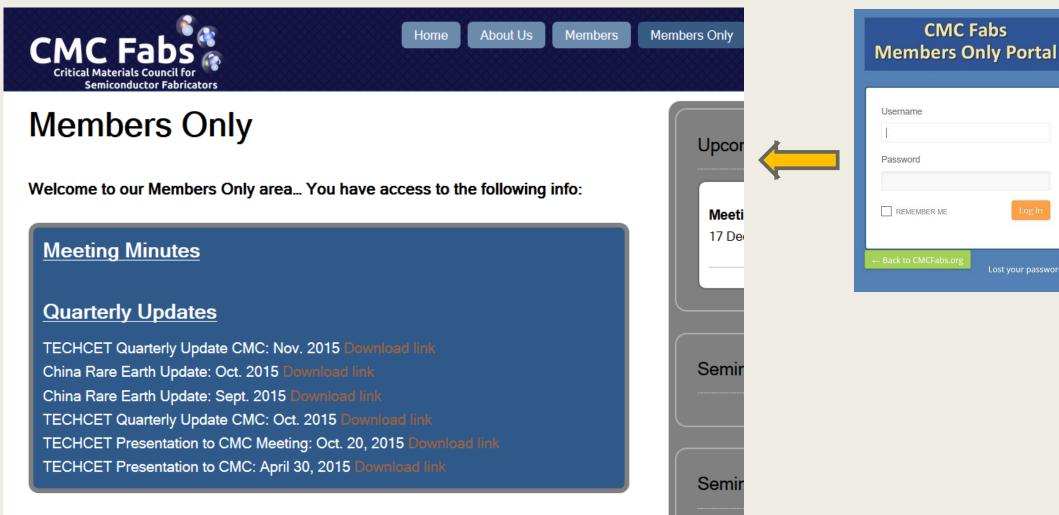
7 Principle Advantages of CMC Fabs

- 1. Access to the most current and accurate Critical Materials Information.
- 2. Paths to prevention and remedy of material shortages.
- 3. Smooth and timely transition from Sematech to TECHCET CMC.
- 4. Get important and current info on the Asia Supply Chain with a special focus on China.
- 5. Collaborate with other organizations.
- 6. TECHCET has a 15 year history of providing Critical Materials Information we know materials.
- 7. TECHCET is able to bring New benefits to the CMC that were not available before.



12/17/2015

CMC Members Only Portal: www.cmcfabs.org



Lost your password?

Meeting Schedules for 2016

for Sematech CMC Members

2016 CMC F-2-F Meeting Plans

Meeting date	Location	Event Content	Supplier presentations for day 1 -2 closed session & day 3-4 seminar
May 3-4	Hillsboro or Portland, Oregon	 CMC Meeting Member Share Topics & Round Table Discussion Supplier Presentation (3-4/material) Supplier Tour, if available 1:1 supplier meetings 	Supplier and Experts (choose 2). Will do survey ahead of meeting. • Wafers • Photoresists and Ancillaries • Gases • Target and Quartz • Wet Chemicals • CMP • ALD Precursors
May 5-6	Hillsboro or Portland, Oregon	CMC Seminar	"Materials Requirements for the Future of Semiconductor Devices"
Nov 10-12 in Korea w/ i-SEDEX2016 Or Oct 15-17 in China w/ ICPT 2016	Seoul, Korea Or Beijing, China	 Asia Supply Chain Management Global sourcing, forecast and demand, transportation, quality, and ship-to-control etc Other New Topics 	 Supplier and Experts Wafers Target and Quartz Wet Chemicals CMP Others

May 2016 Meeting Focus and **CMC** Seminar

for Sematech CMC Members

12/17/2015

Day 1 & 2— Critical Material Council Member Share Topic Examples

- 2 Member-company topics of interest are selected for discussion and presentations at each F-2-F meetings
- Strategic Supplier Management and Award
- Metrics for Procurement Effectiveness
- Cost Structure Analysis at Supplier
- Managing Supplier Performance
- Material Cost Reduction Strategy
- Materials Forecasting Methods

- Sourcing and certification of Conflict Materials
- Conservation and PFC Reduction
- Chemical and Gas Logistics Concepts
- Second Material Source Qualification
- Supplier Material Sourcing Strategy
- Metrics for Inventory Performance
- Other New Topics (Global Logistics, Product Resume, etc..)



Monkey Survey

CMC Fabs Survey All responses will be collected, tailled, and shared with CMC members during our next meeting. Individual response details will not be released. * 1. Contact Info What is your full name and what company do you work for? Name Company * 2. CMC Focus Area 2016 Please Indicate your level of Interest but ranking from 1 (least) to 5 (most) Interested which of the following you would like to focus on during the next face to face meeting? 5 Strategic Supplier Management and Award Metrics for Procurement 0 Effectiveness Cost Structure Analysis at Supplier Managing Supplier 0 0 Performance Material Cost Reduction 0 Strategy Materials Forecasting 0 0 Methods Sourcing and Certification 0 0 0 of Conflict Materials Conservation and PFC 0 0 Reduction Chemical and Gas Logistics Concepts Second Material Source Qualification Supplier Material Sourcing CMCFabs / TECHCET CA LLC Confidential -12/17/2015

CMP		O	0	0	0
Consumable Equipment Components (Quartz, SiC, Ceran	nics)	0	0	0	0
Gases	0	0	0	0	0
Photoresists	0	0	0	0	0
Targets	0	0	0	0	0
Wafers	0	0	0	0	0
Wet Chemicals	0	0	0	0	0
Other (please indicate your level o	f interest from 1-5)	g.			
 Hot Topics Please indicate your level of topics you would like to foc 				ted which of the foll	owing hot
	1	2	3	4	5
SOI-ecosystem: Demand & supply balance/outlook	0	0			
			U	0	0
Business Trends: Outlook for 2016 (business levels, trends, etc.)	0	0	0	0	0
for 2016 (business levels,	0	0	0	0	0
for 2016 (business levels, trends, etc.)	0	0 0	0	0	0
for 2016 (business levels, trends, etc.) NF3 Issues	0	0 0 0	0 0 0	0	0 0 0
for 2016 (business levels, trends, etc.) NF3 Issues Rare Earths	0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0 0

Please indicate your level of interest but ranking from 1 (least) to 5 (most) interested which of the following material categories you would like to focus on during the next face to face meeting? (note: 2 categories will be selected)

* 3. Material Supply Chain Status/Review - For Face to Face Meetings

ALD/CVD Precursors

Day 1 & 2 — Critical Material Seminar and User/Suppliers/ sub-suppliers engagement - for May 2016

- 6-8 suppliers from 2 categories are chosen and invited for the closed door meeting. Categories and leading suppliers are listed below:
- Wafers SunEdison, SUMCO, Shin-Etsu, Siltronic AG, LG Siltron, QL, Wafer Works, GlobalWafer(SAS) etc.
- Photoresists /Ancillaries JSR, Shin-Etsu, DOW PR, EKC/DuPont, TOK, AP/ACT, ATMI/Entegris, Brewer/Nissan, Dongjin SEMICHEM, Dongwoo Fine-Chem, Sumitomo, SACHEM etc.
- Gases Air Liquide, Air Products, Linde, Matheson, Praxair, Voltaix, SK/OCI Materials, Linggas, Pujiang Gases etc.
- Targets Honeywell, Praxair, Tosoh SMD, HC Starck, GAM, Ulba, Grikin, KFMI etc.
- Chemicals DOW/DuPont, DuPont, ATMI/Entegris, KMG, Honeywell, Ethone (MacDermid), ENF Technology, Kanto Chemical, Rudong Zhenfeng Yiyang, Niching, AEUCC, etc.
- CMP Cabot/NexPlanar, DOW CMP, FujiFilm, DA Nano/AP, Dongjin SEMICHEM, KCTech(Material), BASF Korea, Saesol Diamond, Soulbrain, Dongwoo Fine-Chem, Anji, Kinik, Uwiz, etc.
- ALD Precursors Air Liquide/Voltaix, Air Products, Strem, Merck/SAFC Hitech, Dow Corning, ATMI/Entegris, Gelest, Nova-Kem, etc.

NOTE: This is a list that can be used to select suppliers to present during May 2016 meeting in the US.



CMC & x-CMC Informal Survey Results

Top 3 Most Popular Benefits of the CMC

- 1.URGENT Supply Chain Issues Discussion and Collective Action
- 2.TECHCET's Critical Materials Reports
- 3.Networking

New/ Improvement Areas (requested from 3 or more people)

- 1.Demand and Supply focus
- 2. China Supply Chain Deep Dive

Other Ideas interest & Comments

- 1. Neon continued research on supply / demand
- 2. Structure all Surveys to Include quick pull down menus for quick / efficient answering
- 3. Include more than one end user's site to survey to cover regional differences.
- 4. Want more Supply / Demand curves to use to anticipate problems BEFORE they occur; 6-12 months ahead
- 5. Would like to see more useable end-products come out of the council initiatives, i.e. standards, or useful tools, i.e. RFID, or QR Code (product resume)

Responses to the questions: "What do you like about the CMC?" and "What could be improved about the CMC?"

- · Benchmarking should be secondary to identifying supply and demand issues
- The sharing portion of the CMC gives us an opportunity to learn if one of the member companies is experiencing a unusual uptick in demand that might impact other members
- We don't want a sales pitch from materials suppliers we just want a perspective of the market and information /intelligence to give us an understanding of market changes and any political situations that might impact them.
- I would like to attend a monthly meeting on best practices of source and supply methods
- Would like early warning supply/demand factors that may impact my supply and availability of materials. Would like more supply and demand information
- Although, sharing is limited during the meeting, but overall I am positive about it it does give us a common platform for discussion during the networking session.
- · Would like to see as an output of the CMC some sort of standard or guidelines that we can all benefit from, i.e. QR codes or RF ID
- I would like the opportunity to attend a seminar on the second day or after directly after the CMC meeting at the same location. I usually cannot justify a trip just to go to a materials conference.
- Would like to make an effort to get second regional sites of a given CMC member company to participate in surveys, because often different sites have an entirely different set of buying habits, priorities, availability, pricing
- I appreciate the structure of surveys that are quick and easy to get through, i.e. drop-down menus can help cut the time in half to do the survey.
- Could we do a workshop on reduced usage, mitigation and repair? And/or take the lead on recycling of gases in short supply like neon or Helium?
- I know some fabs are not interested in emerging materials but I have always been focused in this area.
- It is good to have a validation on why a material is in short supply even if you can't do anything about it. At least you can tell your company that it is not the fault of the individual procurement manager
- Each and every meeting should have some valuable content driving the participation. Do not want to attend meetings that are simply planning meetings for the face-to-face
- · We have interest in some materials that are not of as much interest to others, But we [somehow still need to get] more detailed information on our supply-chain
- · Networking is a valuable part of being involved in the CMC.
- · We need supply and demand information
- It would be good to get risk assessments and forewarnings, we also appreciate market shares information on suppliers
- The general information presented by suppliers in the CMC meetings we do not find very useful
- · We want to know in advance of a problem happening not after the problem happened
- We would like validation from a third-party to check on our information, and information we are getting from our suppliers
- We need more information on the semiconductor materials supply chain in China
- · Having a network of end-users helped us to pool our resources to solve problems like the commonality of C of As



"Critical Materials for Device Driven Scaling"

a Critical Materials Council Seminar May 5-6, 2016

CMC Seminar Overview

The Critical Materials Council Seminar is a 2 day event providing actionable information on manufacturing supply-chains for current and future semiconductor materials. Business drives the world, but technology enables semiconductor business, so we must understand the dynamics of how materials and technologies enable the scaling of devices in IC fabs. Seminar speakers will provide information on critical direct-materials used in established high-volume manufacturing (HVM) fabs, while also looking at manufacturing integration issues associated with new materials needed for future devices. Evolutions within global materials supply-chains for HVM of CMOS chips will be covered, as well as long-term revolutions in devices beyond-CMOS such as spintronics and carbon-based devices.

Dates and Location

Dates: May 5-6, 2016, following the Critical Material Council regularly scheduled Meetings.

Location: Hillsboro, Oregon

CMC Seminar 2016

Conference Overview

- Keynote: "Material Requirements for the Future of Semiconductor Devices"
- Four Sessions
 - Market Briefing electronic applications, semi devices, equipment, and materials
 - Tracking the Supply Chain down to Earth, Wind and Fire
 - Emerging Materials Evolution: ALD / ALE
 - Materials Revolution: "The Carbon generation" 8 yrs.
- Featuring Speakers from: Materials and Equipment Suppliers, Device Technologists, Market Analysts

- CMC Seminar 2016, cont. -

Schedule (Agenda details available January 30)

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May 4 (Wed, night): 5pm to 7pm, Evening Welcome Reception

May 5 (Thurs) - Day 1

- 1. Day 1 Keynote 30 min. 8:30 am 9am
- Market overview session (30 x 3) 1.5 hr 9am-10:30

Coffee break 15 - 20 min 10:30 - 10:50

- 3. Session II (30 x 4) 2hr 10:50-11:50
 - Lunch break 60 min (11:50 1:00)
- 4. Session III, cont. 1:00-3:00

 Coffee break 15 20 min 3:00 3:20
- 5. Session III, Evolutionary Materials, cont. 3:20 4:20
- 6. Panel Discussion 4:20 5:00

Evening Reception: 5pm - 7pm

May 6 (Fri) - Day 2 (4 hours)

- 1. Day 2 Keynote 30 min. 8:30 9:30
- Session IV 1 hr 9:00 10:30
 Coffee break 15 20 min 10:30 10:50
- 3. Session IV, cont. and Panel Discussion 2hr 10:50-11:50
- 4. 11:50 noon Wrap Up

Questions / AR's / Wrap-Up

AR's

- Monkey Survey will be sent out before the holidays quick & easy to complete
- Please feel free to make suggestions about the second Face 2 Face meeting in 2H16
- Let Lita know if you are interested in participating in the CMC Seminar Committee (Lshonroy@techcet.com)
- TECHCET will Follow up with each Company and MOU will be sent out
- Happy Holidays!

Thank You!

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