

## Workshop on **Automotive Lead Battery Advancements (ALBA)**

**21-22 May 2025**

**Turin, Italy**

The *Consortium for Battery Innovation* (CBI) in collaboration with *European Committee for Electrotechnical Standardization* (CENELEC TC21X WG3) are holding a workshop bringing together global technical experts from the advanced lead battery and automotive industries.

Since eight years now, this **workshop series** (Kloster Eberbach 2017, Alcalá de Henares 2018, Bruges 2019, online 2020, Bergamo 2022, Wolfsburg 2023, Paris 2024) has enabled technical in-depth discussions about hot research topics among the **automotive battery** industry, their suppliers and customers, and research institutes.

Compact plenary talks will expose overviews and summaries to all participants. In break-out sessions, each participant will have the opportunity to **discuss in depth** three of the following topics and plan collaborative work streams associated with them:

- Characterization results and trends for IEC 60095-8 **charge recovery** of both SOC and SOF (state of charge, state of function)
- Which **mechanisms** are limiting SOC recovery and enabling **transient SOF boost**?
- Guidelines to **operate 12V batteries** in battery-electric vehicles, evaluating slow voltage ramps and innovative approaches from other industries
- Smart system integration of **auxiliary and backup batteries**: design trade-offs and SOF monitoring for safety-relevant (**ASIL**) 12V-power applications
- Optimizing **positive active mass (PAM)** for auxiliary and backup batteries
- **AGM saturation**, acid displacement while charging, and evolution of side reactions,
- **Engineering tools** for automotive application engineers, including battery sizing based on IEC 60095-8 **pulse-power characterization (PPC)**

A special session will discuss **market trends and challenges** for automotive 12V systems and their batteries, and opportunities for the lead battery supply base.

**CBI** will also hold the **European Technical Workshop** on 19-20 May at the same location, see separate invitation for CBI member companies.

Working groups are preparing 7 interactive sessions as tentatively outlined on the following pages. The final agenda will be available in April on <https://batteryinnovation.org/alba-2025/>.

We are looking forward to meeting you in person this May in Italy!

# *INTERNATIONAL LEAD ASSOCIATION*

## **COMPETITION LAW COMPLIANCE GUIDELINES**

### **Conduct of Meetings**

ILA members are bound by a set of guidelines which are designed to ensure compliance with competition law in all major jurisdictions. Every member company is provided with a copy of the guidelines and agreement with their terms is a condition of membership. The following extract governs the conduct of Association meetings.

- 1) **Supervision by counsel or others.** It shall be for the Association to decide whether any topic for discussion requires Counsel to attend any meeting of the Association. In the event that Counsel is not required it will be necessary for a Member or Officer with sufficient knowledge and understanding of the restrictions imposed by these Guidelines to be present.
- 2) **Minutes.** Minutes must be kept of all meetings and must accurately report what actions, if any, were taken.
- 3) **Literature or Handouts** Whether prepared by the Association staff, individual Members or guest speakers, any literature or handouts which it is felt may have anti-competition implications must be reviewed by counsel in advance of distribution.
- 4) **Prohibited Topics** The following topics of discussion must be avoided at all Association meetings and other functions:
  - a) past, current or future pricing practices;
  - b) what constitutes a "fair" profit level;
  - c) elements of price, costs or methods of constructing prices;
  - d) discounts, credit terms or other conditions of sales;
  - e) individual companies' market shares or the allocation of markets or customers;
  - f) refusals to deal with any supplier or customer;
  - g) confidential company statistical data or competitive plans or forecasts;

In the event that a subject is raised at any meeting of the Association which causes an anti-competitive concern to an attending Member, that member should immediately draw his or her concern to the attention of a Member of the Association's staff and request that the discussion be discontinued until such time as the Member is satisfied as to its propriety.

- 5) **Informal Meetings.** These guidelines also apply to lunches, dinners and like social functions that may precede or follow Association meetings. Competition law violations occurring at social functions carry the same legal impact as those occurring at formal meetings.

Wednesday, 21 May 2025			Thursday, 22 May 2025		
10:00	coffee		08:30	Plenary - Mondoloni, Hollas Discussion: harge recovery & battery monitoring	
10:30			09:00	Overview CRC 0-4	
11:00			Plenary - Welcome		09:30
	The Small Battery Challenges Introducing 3 tasks (plenary)			Breakout CRM 1-5 PAM mechanisms	Breakout CRC 0-4 CR-rep, hysteresis
11:30	The Small Battery Challenges breakout sessions (3x2 parallel)		10:00		
12:00	lunch break fingerfood buffet		10:30	coffee	
				Overview CRM 6-9	
12:30			11:00	Overview CRC 5-9	
13:00	The Small Battery Challenges 6 team s' pitches		11:30	Breakout CRM 6-9 improving CR	Breakout CRC 5-9 SOF profiles, EOL, LIB, SIB
13:30	Plenary - Zolin Discussion: OEM panel		12:00	fingerfood lunch	
14:00	Overview CSO (incl. 2 ALBAplus projects)		12:30		
14:30	Overview PAM (incl. overview Trinidad)		13:00		
15:00	Breakout PAM 6 posters	Breakout CSO 4 poster stands	13:30	market trends and opportunities 10 plenary talks & panel discussion	
15:30	coffee		14:00		
16:00	Overview SAT		14:30	coffee, ALBA departure	
16:30	Overview AUX (incl. IEC and 1 ALBAplus project)		15:00		
17:00	Breakout SAT 5 posters	Breakout AUX 5+1 posters		Ahlström plant tour, option for other groups meetings (until 18:00 max)	
17:30	end of day				

Wednesday, 11:10 - 13:30

The Small Battery Challenge			SBC	11
Shane Christie	PAM for world-record SOF recovery	SBC1	-	
Egbert Lodowicks *	small BACKUP battery design	SBC2	11	
Rolf Naumann *	24/7 charging strategy	SBC3	-	

Wednesday, 13:30 & Thursday, 8:30

OEM Perspectives			P	13
Lorenzo Zolin	12V lead-acid batteries emerging needs on an evolving scenario	P1	15	
Christian Mondoloni *	Lead-acid battery Charge Recovery review and expectations	P2	21	
Markus Hollas *	12V Battery diagnosis: SOF	P3	24	

Wednesday, 14:00 - 14:30

Breakout Session 14:50 - 15:35

12V charging strategy and operation for BEV			CSO	27
Kevin Luo *	Lead-acid battery charging strategy for NEVs	CS01	29	
Michael Gossner	Lead battery application studies in electric vehicles	CS02	34	
Roger Zimmermann*, Eckhard Karden	CBI recommendation for 12V charging strategy in BEV	CS03	39	
Benjamin Hübner, Sebastian Mauer	Water consumption during 24/7 charging operation at different temperatures and voltages	CS04	43	
Jörg Tiburcy, Sylvain Angoujard	Three charging strategies for drive cycle evaluation	CS05	44	
Sebastian Mauer, Norbert Röttger	Drive cycle simulations at IBR	CS06	49	
Rolf Naumann *	How should the 12V charging strategy support lead-acid battery monitoring?	CS07	52	
Jesus Perez	2V-AGM cell testing AUX batteries with different charging strategies	CS08	57	
Paul Wulfert-Holzmann	Application of pulsed charging on automotive batteries	CS09	65	

Wednesday, 14:30 - 14:50

Breakout Session 14:50 - 15:35

Improvements of positive plate and PAM recipes			PAM	67
Francisco Trinidad	Positive active material additives overview	PAM1	69	
Jun Furukawa, Akihiro Watanabe, Balazs Broda	PAM additives for capacity increase	PAM2	76	
Miguel Garcia, Jesus Valenciano, Luca Brisotto	Improvement of PAM utilization of lead acid batteries	PAM3	80	
Thomas Wojcinski, Marco Robotti, Enqin Gao, John Miller, Francisco Trinidad, Steve Barnes, Gordon Becklev	Investigation of doped lead-silicates as PAM additives	PAM4	84	
Eric Miller	PAM compression with reverse-oriented Stratosphere PE + Gel separator	PAM5	92	
Marcus Young, Grant Spencer, Jack Scott, Subhas Chalasani, Travis Hesterberg	Live lead-battery cell characterization using X-ray Computational Tomography	PAM6	98	

Wednesday, 16:05 - 16:25

Breakout Session 16:45 - 17:30

Saturation changes over time and location			SAT	103
Campbell Matthews	Reference electrode measurements and local saturation variation in AGM batteries	SAT1	105	
Abel Sy *, Eric Miller	Stratosphere AGMe enhancing both filling and plate uniformity	SAT2	110	
Jibo Zhang, John Wertz	Saturation calculations of AGM cells in practical long-term tests	SAT3	117	
Pritpal Singh, Scarleth Vasconcelos, Subhas Chalasani, Ross Lee	Real-time magnetic field mapping of current distribution in lead-acid batteries	SAT4	120	
Abderrezak Hammouche, Stephen Görtler, Nils Pfeiffer, Jörg Tiburcy	Can current ripple cause acid spillage in EFB battery during overcharging with ripple?	SAT5	124	

Wednesday, 16:25 - 16:45

Breakout Session 16:45 - 17:30

Testing and sizing methods for auxiliary & backup batteries			AUX	131
Luca Brisotto	IEC 60095-8 standard: CDV Update	AUX1	133	
Florian Bucher, Luca Brisotto	IEC 60095-8-PPC and CR: one step versus 2-step profiles	AUX2	136	
Jonathan Wirth	PPC-based sizing tool	AUX3	138	
Bernd Engwicht, Eckhard Karden	Closing out CBI SSOF Testing	AUX4	140	
Kohei Koga	AUX field battery investigation on HEV in Japanese market	AUX5	143	

Thursday, 9:00 &amp; 11:00

Breakout Sessions 9:30-10:15 &amp; 11:15-12:00

<b>Charge Recovery of 12V batteries in BEV: Collecting our test data</b>			<b>CRC</b>	
Eckhard Karden	<b>Transient Charge Recovery: SOF vs. SOC observations</b>	CRC0		147
Hürkan Catalkaya, Eckhard Karden	<b>Repepitive Charge Recovery with 5 EFB batteries</b>	CRC1		149
Rodrigo Cavendish	<b>Repetitive Charge Recovery in 12V and 2V EFB</b>	CRC2		155
Luca Brisotto	<b>Charge Recovery and SOF hysteresis cycles</b>	CRC3		161
Jesus Valenciano, Miguel Garcia, Luca Brisotto	<b>Hysteresis cycles - 12V EFB and AGM vs. EFB</b>	CRC4		165
Markus Saal	<b>Realistic SOF profiles versus IEC CR test results</b>	CRC5		169
Ian Wolfe, IEC TC21X WG2 members	<b>AGM Charge Recovery - Impact of aging and NAM changes</b>	CRC6		173
Thorsten Werle,	<b>Clarios truck AGM charge acceptance outperforming in field compared to lab test according to customer specification!</b>	CRC7		180
Paul Everill	<b>Strengths and weaknesses of Li-ion batteries as AUX</b>	CRC8		184
Shawn Peng, Eason Tu	<b>Charge Recovery test method for cell-technology comparison</b>	CRC9		189

Thursday, 9:15 &amp; 10:45

Breakout Sessions 9:30-10:15 &amp; 11:15-12:00

<b>Mechanisms limiting Charge Recovery of power &amp; energy</b>			<b>CRM</b>	
Eberhard Meissner	<b>PAM structure &amp; fast SOF recovery: steps to understand those characteristics</b>	CRM1		197
Jonathan Wirth	<b>Evolution of pseudocapacitance during simulated real-world BEV operation</b>	CRM2		199
Plamen Nikolov, Maria Matrakova, Albena Aleksandrova	<b>On the nature of pseudo-capacitance or "surface charge" of PAM: Investigation of CR by "classical" analytical and structural techniques</b>	CRM4		207
Paul Everill	<b>Structural analysis of PAM under AUX-CR / ROD testing; underpinnings of capacitance?</b>	CRM5		213
John Wertz, Shane Christie, Campbell Matthews, Jibo Zhang	<b>Charge Recovery improvement from GEM/AA Negative plates for Auxiliary, Start/Stop and Opportunity-Charging Applications in AGM batteries</b>	CRM6		218
Yu Ping	<b>NAM modificati on effect on Charge Recovery</b>	CRM7		225
Jochen Settelein	<b>CBI project - DOE study for optimizing Charge Recovery</b>	CRM9		229
Markus Föhlich	<b>Experimental Techniques for NAM Recipe Variation</b>	CRM8		234

Wednesday, 28 Feb 2018

Market trends and technology opportunities			FUT	239
Torsten Hildebrandt	Update about European Legislation	FUT1	241	
Kohei Koga	Market Trend in Japan and Southeast Asia	FUT2	248	
Gao Guoxing *, Yu Ping	The trend of LAB as low-voltage power for NEV	FUT3	250	
Zhao Ke	NEV low-volt battery application and trend	FUT4	252	
Dustin Lee	North American market trends	FUT5	257	
José Otávio Peroba	Market trends for South America	FUT6	261	
Bernd Engwicht	European market trends	FUT7	264	
Gunnar Ledfelt	Market trends for truck & bus 12V/24V batteries	FUT8	-	
Begüm Bozkaya	CBI automotive activities	FUT9	269	
Matt Raiford	A few important CBI activities on the horizon	FUTX	271	