

## **ELIBAMA stakeholders' conference – Agenda**

9:30 am            *Arrival and Coffee*

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9:45 am            *Introduction*

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- *The challenges for the Battery Industry development for E-mobility in Europe (C.Chanson - Recharge)*
- *ELIBAMA project overview: from raw materials to manufacturing (J.Peyrard – Renault)*
- *A Car maker perspective (tbd)*

10:55 am           *Coffee break*

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11:10 am           *Innovative electrode materials and manufacturing processes*

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- *LiTFSI against LiPF6 : a losing battle ? (F.Metz - Solvay)*
- *Special 3D copper foils to lower production costs for batteries (H.Holeczek - Fraunhofer IPA)*
- *Aqueous based and solvent free electrode coatings (Daimler, Renault, Saft)*
- *...*

12:30 pm           *Lunch and exhibition*

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01:30 pm           *Innovative cells manufacturing processes*

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- *Assembly and Joining of Li-Ion-Cell Sheet-Stacks (D.Lindenau-Daimler)*
- *Process cleanliness control in Li-ion battery manufacturing: Impact of filtration and purification solutions on battery production (C.Herriot-Entegris)*
- *Non-destructive tests of EV cells (M.Armstrong – University of Newcastle)*

02:45 pm           *Coffee break*

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03:00 pm           *Eco-design tools and batteries end of life management*

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- *Life-Cycle Assessment in Lithium-ion batteries (M.Gama – PE INTERNATIONAL)*
- *Toward an efficient batteries recycling process (R.Laucournet - CEA)*
- *...*

04:25 pm           *Conclusion*

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04:30 pm           *End of the conference*

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## **ABSTRACTS:**

### **The challenges for the Battery Industry development for E-mobility in Europe**

**Speaker:** C.Chanson – Recharge

**Abstract:**

The presentation will introduce a SWOT analysis of the challenges for the European battery industry facing the e-mobility development. Strength and weaknesses will be reviewed in the perspective of a Technical roadmap, an Industrial roadmap and a Business roadmap.

A special focus will be placed on the value chain of the battery for e-mobility, including the impact of the recycling costs.

### **ELIBAMA project overview: from raw materials to manufacturing**

**Speaker:** J.Peyrard - Renault

**Abstract:**

The global objective of the ELIBAMA project is to enhance and accelerate the creation of a strong European automotive battery industry structured around industrial companies already committed to mass production of Li-ion cells and batteries for EVs. By exploiting advanced eco-design methods of manufacturing battery cells, the project aims at guaranteeing drastic gains in cost reduction and environment-friendliness across the value chain of the battery production.

This presentation will draw an overview of the ELIBAMA project's context and highlight the main results after 3 years of work.

### **LiTFSI against LiPF6 : a losing battle ?.**

**Speaker:** F.Metz – Rhodia - Solvay

**Abstract:**

For the design of an effective Li-ion battery, the nature of the lithium salt entering the composition of the electrolyte is of paramount importance and has to fulfill many requirements; in particular, the chemical and thermal stability of the Li salt, along with other physical properties (ion mobility, ion pair dissociation, solubility, SEI formation...) is of crucial importance.

Compared to the benchmark LiPF<sub>6</sub>, LiTFSI (lithium bis(trifluorosulphonyl)imide) displays interesting physical and chemical properties, but its use in large scale batteries is hampered by its manufacturing cost, markedly higher than that of LiPF<sub>6</sub> due to a more complex manufacturing process.

To address this problem, 2 tasks aiming to bring cost efficient and sustainable solutions for large format batteries using the chemically and thermally stable lithium salt LiTFSI were deployed within the ELIBAMA consortium :

1. Optimisation of the proprietary process for manufacturing potassium triflate (TFSK), key intermediate in the LiTFSI production.
2. Setting-up an effective recycling process for LiTFSI contained in LiTFSI based batteries electrolytes.

The results obtained within these two topics will be presented and commented.

### Special 3D copper foils to lower production costs for batteries

**Speaker:** H.Holeczek – Fraunhofer IPA

**Abstract:**

The aim for the use of 3D-structured anode foils for batteries is to decrease the production time and to reduce the binder material.

An additional aim is to reduce the contact resistance between the active material and conductor foils by special micro-roughness on the foil surface.

During the Elibama project a special production technology for copper foils was developed, which fulfill these aims.

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### An automotive battery industry in Europe: a chance to take?

**Speaker:** G.Patry - Renault

**Abstract:**

The industry of lithium-ion batteries is currently mainly localized in Asia: R&D centers as production factories are principally in Japan, Korea and China, especially for automotive applications. If this industry is already well developed, it has the potential to become gigantic. The aim of the project Elibama is to support the battery industry in Europe. If some major players of the battery market are European, they are not able to compete against the extremely powerful industrial group, as LG, Panasonic or Samsung on markets such as batteries for electric vehicles. To understand the challenges behind a development and production of lithium-ion batteries in Europe, several aspects are investigated herein. The effect on cost of a European production in comparison with Asia is estimated. Then the contribution of Elibama to reduce manufacturing cost is discussed. Finally, the interest of an “Airbus of batteries” is studied.

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### Assembly and Joining of Li-Ion-Cell Sheet-Stacks

**Speaker:** D.Lindenau - Daimler

**Abstract:**

Design, performance and costs of a Li-Ion-Cell depends on the accuracy, robustness and effectiveness of every single step in stacking, assembly and joining of each component of the cell. The cell stack and its joint to the cell contact have been identified as a key to enhanced quality and active area.

New approaches and solutions are presented regarding handling, clamping and stacking the coated sheets. In addition the results of fundament research on ultrasonic welding are shown, that lead to a better seam quality using less space.

### **Process cleanliness control in Li-ion battery manufacturing: Impact of filtration and purification solutions on battery production.**

**Speaker:** C. Herriot (Entegris)

#### **Abstract**

In this presentation, a complete study of the contaminants found during battery manufacturing is reported; metallic and non metallic particles were identified at different production stages. The methodology developed to detect the sources of contamination and their nature on the whole line is explained. For each process step, the main sources of contamination were classified into different categories. Among the different factors that contributed to contamination, raw materials appeared critical: filtration and purification solutions were implemented and the solution's efficiency was measured. Finally, a significant impact of filtration on 40 Ah battery cells was observed.

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### **Life-Cycle Assessment in Lithium-ion batteries**

**Speaker:** M. Gama (PE INTERNATIONAL)

#### **Abstract**

The ELIBAMA project had main focus in the development of new technologies for manufacturing lithium ion batteries, in order to guarantee gains in cost reduction and environment-friendliness across the value chain of the battery production. The improvements were monitored and validated from the environmental point of view by an integrated assessment, using LCA methodology, along the project. PE INTERNATIONAL had an independent position, playing the moderator role among the consortium partners and enhancing the communication from the different parts. Furthermore, PE provided the battery manufacturers in the project with a flexible eco-design tool. The methodologies used, the main challenges and results will be presented.

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### **Toward an efficient batteries recycling process**

**Speaker:** R. Laucournet (CEA)

#### **Abstract**

The end of life of Li-ion batteries is a key issue to respect the sustainability of the electrical vehicles value chain. In Europe, this point is strictly framed by the directive 2006/66. This regulation pushes pressure on batteries producers and therefore on recyclers to reach the target of a fixed recycling efficiency which is 50 wt.%. Through ELIBAMA project, partners involving in the task dedicated to the recycling: SNAM (FR), Fraunhofer IPA Institute (GR), SOLVAY (FR) and CEA (FR) have identified several improvement ways to overcome the limits of current processes. The given presentation will show in a first part the main ways of Li-ion batteries recycling, the current limits and the challenges that require effort. In a second part, the most significant results obtained in the ELIBAMA project to increase the recycling materials efficiency will be presented and perspectives to the project given.

## **BIOGRAPHIES:**

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**Matthew ARMSTRONG**  
**NEWCASTLE UNIVERSITY - Programme Coordinator.**

**Biography:** MEng, Ph.D.  
MSc Programme Coordinator.  
Degree Programme Director: MSc Automation and Control.  
Member of the Institution of Engineering and Technology (MIET)

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**Claude CHANSON**  
**RECHARGE association - General Manager**

**Biography:** Claude Chanson is Engineer in chemistry and physics from Bordeaux ENSCPB (1982) and has obtained a PHD in Electrochemistry in Bordeaux 1 University (1986). He previously served in Saft as an engineer in R & D and project manager in the telecommunications and automotive, before taking the office of Division Technical Manager and finally for Saft Group, the mission of Director of the Li-ion technology. He has moved to RECHARGE, representing the rechargeable battery industry interests with the Europeans Bodies, since 2 years.

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**Margarida GAMA**  
**PE INTERNATIONAL – Senior consultant**

**Biography:** Margarida Gama is senior consultant at PE INTERNATIONAL (Germany), having joined the company in 2010. Margarida is an expert on LCA and eco-design, working mainly within the consumer goods sector, especially in the fields of electronic and electro-mechanic products, as well as batteries. She is project manager and her recent activities include product-related environmental assessments, development of reporting and eco-design tools and studies to support the communication of sustainability policies. She has worked not only at company level, but also within industry associations and on EC projects.

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**Andrea GLAWE**  
**KROENERT GmbH & Co KG – R&D Director**

**Biography:**

Education:

Study: 1992 Master degree for "Technical textiles and process technology" at the Technical University of Chemnitz

Professional Development:

1992 – 1993 Scientific assistant Textile Research Institute Plauen GmbH  
1993 – 2001 Scientific assistant Textile Research Institute Thüringen-Vogtland e.V. Greiz  
2001 – 2011 Coatema Coating Machinery GmbH, Dormagen  
Deputy sales director, technical sales and project manager  
2011 – Feb. 2012 R&D leader DRYTEC GmbH & Co KG, Norderstedt  
Since March 2012 Director R&D KROENERT GmbH & Co KG, Hamburg



**Cristelle HERRIOT**  
**ENTEGRIS – Application Engineer**

**Biography:** Cristelle Herriot is currently an Application Engineer at Entegris where she is in charge of the development of contamination control solutions for the energy market. She holds a PhD in Materials Science and Engineering obtained at the Paul Sabatier University (Toulouse, France). From 2006 to 2010, she worked in two different laboratories in US, Drexel University in Philadelphia and North Carolina State University in Raleigh: she focused her research on the development of new materials for energy storage systems such as supercapacitors, Lithium ion batteries and fuel cells. She developed high energy anode electrodes at the CEA (Centre d'Énergie Atomique) from 2010 to 2012.



**Harald HOLECZEK**  
**FRAUNHOFER IPA – Senior project manager**

**Biography:** Harald Holeczek is a senior scientist and project manager at the Fraunhofer Institute for Manufacturing Engineering and Automation in Stuttgart, Germany. He is working in the Electroplating department and has been involved in the development of processes and specialized equipment for more than 15 years. He has published over 20 papers in that field. In the ELIBAMA project he was involved in the process development for 3D structured current collector foils and in the project management.



**Richard LAUCOURNET**

**CEA – Group head in the development of advanced materials for new energies**

**Biography:** Dr R. Laucournet (40 y): PhD in materials science in 2001 at Limoges University (FRANCE). He spent 7 years in the central research centre of PECHINEY (Alcan Rio Tinto) company in the field of primary aluminium production. In 2007, he joined CEA Grenoble as group head in the development of advanced materials for new energies. Since 2010, he is in charge of a research program focused on recycling of components for technologies of new energy mostly oriented on Li-ion batteries recycling. Now, recycling program led at CEA addresses more types of batteries for electric and hybrid vehicles (Ni-MH, Li-ion), photovoltaic panels, fuel cells, magnetic systems based on permanent magnets and PV panels.



**Dirk LINDENAU**

**DAIMLER – Joining technology powertrain manager**

**Biography:** Diploma in Mechanical Engineering (Manufacturing) University of Technology Aachen  
Fulbright grant to Arizona State University, USA, Industrial Engineering  
Doctoral thesis: "Magnetic effects on laser beam welding", University Stuttgart  
Daimler AG since 2007 : joining and welding of body in white and gearboxes  
Since 2011: manager of team Joining Technology Powertrain



**François METZ**

**RHODIA-SOLVAY – Open Innovation responsible for the GBU Aroma Performance of the Solvay group**

**Biography:** François METZ is Master in chemistry and biochemistry from Strasbourg ULP (1980) and has obtained a PhD in Organic Chemistry in Strasbourg ULP (1985). He previously served in Rhône-Poulenc, then Rhodia and for now Solvay as an engineer in R & D and project manager in many fields (carbonylation, analytical chemistry, fluorine chemistry...).  
Since 2 years he serves as fluorination expert and is in charge of the Open Innovation for the GBU Aroma Performance of the Solvay group.\*



**Gaétan PATRY**  
**RENAULT – PhD Student**

**Biography:** Mr. Patry works since 3 years on modelling of the lithium-ion batteries cost, as a PhD Student. His work is hosted by the French car maker Renault, in collaboration with the university Arts et Métiers ParisTech and the French research laboratory CEA. He holds a master degree in chemical engineering from the Grenoble INP engineering school.

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**Jérôme PEYRARD**  
**RENAULT – Projects manager / ELIBAMA coordinator**

**Biography:** Jérôme Peyrard is graduated from the Ecole Centrale Paris. He started his industrial career in a French automotive supplier VALEO where he gained much experience in industrialization and project management with different European and non-European OEMs. He joined Renault in 2007: after some months as Manufacturing project Manager for thermal engine, he became responsible of the first industrialization of a battery pack for Renault (Fluence ZE). He is since January 2012 R&AE batteries projects manager and ELIBAMA coordinator.

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