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## Summary of the dissemination activities and efforts during the first reporting period

### Task 8.3: ToK and dissemination

The project coordinator has organized several ToK workshops to boost the transfer of knowledge activities between the partners. As explained above, during each consortium meeting a ToK workshop was organized where sometimes researchers from outside the projects were invited to participate as attendees of the lectures provided or as speakers. Below the list of the ToK Workshop that were organized:

|                | Date                | place           |
|----------------|---------------------|-----------------|
| ToK Workshop 1 | 26 January 2012     | SOLVAY-Brussels |
| ToK Workshop 2 | 26 June 2012 PM     | SOLVAY-Brussels |
| ToK Workshop 3 | 26 February 2013 PM | SOLVAY-Brussels |
| ToK Workshop 4 | 04 October 213 PM   | SOLVAY-Brussels |

The table below gives the list of presentations, speakers and attendance of the organized ToK workshops:



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| ToK activities  | speaker  | date         | place           | Related WP  | attendees  |
|---|--|--------------|-----------------|-------------|--|
| <b>ToK Workshop 1</b>   |  |              |                 |             |  |
| Advanced materials for supercapacitor applications by Prof. Frackowiak                    | Oral presentation delivered by Prof. E. Frackowiak PUT       | 26 Jan. 2012 | SOLVAY Brussels | WP2<br>WP4  | E. Frackowiak<br>Y. Maletin, A. Buvailo, N. Stryzhakova, F. Tedjar, E. Raymundo, P. Degée, F. Langouche, A-L Goffin, N. Deligne, F. Gauthy, J-M Blairon, C. Frédérix, D. Chapon, J-F Mousset, Th Le Mercier, A. Goldberg, H. Miltner, Y Dauphin, M. Apostolo, F. Triulzi, B. Neubauer, F. Fouda-Onana, M. Bomkamp, D. Grandfils. |
| PVDFs for binder and PVDFs for separator  | presentation by T. Baert SOLVAY Specialty Polymers           | 26-Jan. 2012 | SOLVAY Brussels | WP2<br>WP3  | As above   |
| SOLVAY's fluorinated chemicals for energy storage   | presentation By M. Bomkamp SOLVAY Special Chemicals Hannover | 26-Jan 2012  | SOLVAY Brussels | WP3         | As above   |
| Business and market perspective for UCs / YUNASKO activity in the field of Ultracapacitor | presentation by Prof. Y. Maletin YUNASKO                     | 26 Jan 2012  | SOLVAY Brussels | WP6<br>WP9  | As above   |
| Ultracapacitor as the key to efficiency power solutions                                   | presentation by Prof. Y. Maletin YUNASKO                     | 26 Jan 2012  | SOLVAY Brussels | WP9         | As above   |
| <b>ToK Workshop 2</b>   |  |              |                 |             |  |
| Nanotechnology topics from Carbon 2012 at Cracow  | presentation delivered by M. Meller                          | 26 June 2012 | SOLVAY Brussels | WP2-<br>WP4 | G. Lota, K. Fic, M.Meller<br>N. Stryzhakova, A. Buvailo,   |



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|  | PUT                                    |              |                 |                   | P. Degée, F. Langouche, A-L Goffin, N. Deligne, D. Chapon, F. Gauthy, D. Grandfils, C. Frédérix, JM. Blairon, F. Gauthy, A. Goldberg, M. Bomkamp   |
| Method definition  | Presentation by N. Stryzhakova YUNASKO | 26-june 2012 | SOLVAY Brussels | WP1               | As above   |
| SOLVAY's fluorinated chemicals for energy storage  | Presentation by M. Bomkamp SOLVAY      | 26-june 2012 | SOLVAY Brussels | WP3               | As above   |
| Molecular modeling as a support for supercapacitor development. Challenges and possibilities | Presentation by K. Fic PUT             | 26-june 2012 | SOLVAY Brussels | WP2<br>WP4        | As above   |
| Hybrid Supercapacitor  | Presentation by G. Lota                | 26-june 2012 | SOLVAY Brussels | WP2<br>WP4        | As above   |
| <b>ToK Workshop 3</b>  |  |              |                 |                   |  |
| Activities of "Department of Electrochemical Power Engineering & Chemistry", KNUVD           | Presentation by V. Barsukov KNUVD      | 26 Feb 2013  | SOLVAY Brussels | WP2               | V. Khomenko, V. Barsukov, N. Stryzhakova, A. Buvailo, E. Frackowiak, K. Jurewicz, K. Fic, M. Meller. P. Gajewski, D. Gastol, P. Degée, F. Langouche, A-L Goffin, N. Deligne, D. Chapon, D. Grandfils, F. Gauthy, V. Finsy. F. Langouche, V. Thulliez, A. Ghanem. G. Laurent, B. Chen, C. Hamon |
| Introduction to hybrid capacitor technology: challenges, opportunities and possibilities     | Presentation by V. Khomenko KNUVD      | 26 Feb 2013  | SOLVAY Brussels | WP2<br>WP4<br>WP5 | As above   |
| YUNASKO experience in developing hybrid  | Presentation by N.                     | 26 Feb       | SOLVAY Brussels | WP2<br>WP4        | As above   |



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| capacitors and testing ionic liquids as electrolytes  | Stryzhakova YUNASKO                    | 2013         |                 | WP5<br>WP6 |   |
| The influence of negative electrode properties on electrochemical performance of Li-ion energy storage systems      | Presentation delivered by M. Meller    | 26 Feb 2013  | SOLVAY Brussels | WP2        | As above  |
| PVDF membrane as separator for hybrid supercapacitor  | Presentation delivered by P. Gajewski  | 26 Feb 2013  | SOLVAY Brussels | WP3        | As above  |
| The influence of activated carbon electrode properties on electrochemical performance of electrochemical capacitors | Presentation by K. Fic                 | 26 Feb 2013  | SOLVAY Brussels | WP2        | As above  |
| Literature review on Li-ion capacitors  | Presentation delivered by D. Gastol    | 26 Feb. 2013 | SOLVAY Brussels | WP2<br>WP4 | As above  |
| <b>ToK workshop 4</b>   |  |              |                 |            |   |
| Challenge for recycling advanced EV batteries   | Lecture delivered by F. Tedjar RECUPYL | 04 Oct. 2013 | SOLVAY Brussels | WP7        | V. Khomenko, A. Buvailo, K. Fic, M. Meller. P. Gajewski, D. Gastol, P. Degée, F. Langouche, N. Deligne, D. Chapon, D. Grandfils, F. Gauthy, V. Finsy. V. Thulliez A. Ghanem.<br>+ By phone conf call : C. Hamon & M. Biso |
| LIC VS other devices  | Lecture delivered by V. Khomenko KNUVD | 04 Oct. 2013 | SOLVAY Brussels | WP5<br>WP6 | As above  |
| Nanostructured Si Anode materials for lithium-ion batteries   | Lecture delivered by J. Menzel PUT     | 04 Oct. 2013 | SOLVAY Brussels | WP2<br>WP5 | As above  |



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## WP 9

### Description of the work performed:

The website of the Energy Caps project has been set up and is continuously updated with the news to be disseminated such as the public deliverables, the announcement for recruitment, the ToK activities etc. Acknowledgment to the EU and the Marie Curie actions on each page is provided.

The consortium is dedicating a session in each consortium meeting to discuss where and what to disseminate according to the different phase of the research and took several initiatives to promote the results of the project to different set of academic and industrial actors.

#### Task 9.1: Project Website

In order to provide an identity of the project, a logo has been designed at the very beginning of the project. A project website (<http://www.energycaps.eu/>) was set up in the first few months after the start of the project in order to provide an active platform for the dissemination of the project results and to attract the attention of the public at large about the foreseen activities

#### Task 9.2: Workshops, seminars and conferences

The consortium members were active in promoting the results of the project and the research objectives to different set of academic and industrial actors through the participation in international conferences, oral and poster presentations in seminars, workshops and conferences. The table below gives a summary of the dissemination activities undertaken so far:

| Conference/Workshop /Seminar  | Who   | When             | Where              | Related WP | remark   |
|---|---|------------------|--------------------|------------|--|
| Carbon 2012 conference  | Poster of M. Meller PUT                     | 17- 22 June 2012 | Cracow, Poland     | WP2        | International conference<br>Attendees from the Energy Caps project:<br>E. Frackowiak, M. Meller,<br>K. Fic |
| Redox active electrolytes for electrochemical capacitors – oral presentation given during 222nd Electrochemical Society Meeting | Presentation delivered by E. Frackowiak PUT | 9 Oct. 2012      | Honolulu , HI, USA | WP2<br>WP4 | International conference<br><br>Attendees from the Energy Caps project:<br>E. Frackowiak                   |



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| Electrochemical hydrogen storage in activated carbons  | Presentation delivered by K. Jurewicz | 16 Nov. 2012    | SOLVAY Brussels   | WP2<br>WP4 | Internal seminar at SOLVAY attended by F. Gauthy, F. Langouche, P. Degée, F. Langouche, A-L Goffin, N. Deligne, D. Chapon, D. Grandfils, B. Chen, |
| MRS Meeting: Symposium W: Carbon nanomaterials, 25-30 November, 2012, Boston, MA, USA.   | Poster of M. Meller                   | 25-30 Nov. 2012 | Boston, MA, USA.  | WP2        | International conference<br><br>Attendees from the Energy Caps project: M. Meller   |
| Methodology for supercapacitor performance measurements Energy Storage: Batteries and Supercapacitors masterclass organized by IDTechEx, | Lecture by N. Stryzhakova             | 16 April 2013   | Berlin, Germany   | WP1<br>WP6 | International Workshop<br><br>Attendees from the Energy Caps project N. Stryzhakova   |
| Oral presentation at INTRASME Electric Vehicles Opportunity Workshop 2013, Title of presentation: "Energy Caps Project"                  | Oral presentation by N. Stryzhakova   | 19 April 2013   | Berlin, Germany   | WP6<br>WP9 | International Workshop<br><br>Attendees from the Energy Caps project: N. Stryzhakova  |
| Supercapacitors of high power and energy density, ISEECap, 2013  | Poster of N. Stryzhakova              | 3-7 June, 2013  | Taormina Italy    | WP6<br>WP9 | International conference<br><br>Attendees from the Energy Caps project: N. Stryzhakova, E. Frackowiak, M. Meller, K. Fic                          |
| How Electrochemical Science Can Improve the EDLC Performance", AABC Europe 2013,   | Invited lecture of Y. Maletín         | 24-28 June      | Strasbourg France | WP6<br>WP9 | International conference<br><br>Attendees from the Energy Caps project: Y. Maletín, N. Stryzhakova, S. Zelinskiy,                                 |



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| N-Doped nanoporous carbons for high power supercapacitor 5th International Conference on Carbon for Energy Storage/Conversion and Environment Protection (CESEP'13) | Plenary lecture of Y.Maletin | 23-26 Sept 2013 | Mülheim Germany         | WP6<br>WP9 | International conference attendees<br><br>Attendees from the Energy Caps project: Y. Maletin, , K. Jurewicz                    |
| 2nd International Conference on Methods and Materials for Separation Processes. Separation Science – Theory and Practice,   | Attendance of Piotr Gajewski | 9-13 June       | Świeradów Zdrój, Poland | WP3        | International conference<br><br>Attendees from the Energy Caps project: Piotr Gajewski   |
| Optimization of the performance of an asymmetric C/C capacitor by mass fitting of electrodes Carbon 2013 conference   | Poster of K. Jurewicz        | 16 July 2013    | Rio de Janeiro, Brazil  | WP2        | International conference<br>Attendees from the Energy Caps project: K. Jurewicz, E. Frackowiak, G. Lota, M. Meller, K. Fic     |
| Optimization of activated carbon electrode for hybrid electrochemical capacitors – Carbon 2013 conference   | Poster of G. Lota            | 16 July 2013    | Rio de Janeiro, Brazil  | WP2        | International conference<br><br>Attendees from the Energy Caps project: K. Jurewicz, E. Frackowiak, G. Lota, M. Meller, K. Fic |
| The influence of graphite electrode on electrochemical performance of high energy supercapacitors – Carbon 2013 conference  | Poster of M. Meller          | 16 July 2013    | Rio de Janeiro, Brazil  | WP2        | International conference<br>Attendees from the Energy Caps project: K. Jurewicz, E. Frackowiak, G. Lota, M. Meller, K. Fic     |



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| The Influence of Graphite Electrode on Electrochemical Performance of High Energy Supercapacitors - 64th Annual Meeting of the International Society of Electrochemistry                | Lecture of G. Lota                  | 12 Sept 2013    | Santiago de Queretaro, Mexico | WP2        | International meeting<br><br>Attendees from the Energy Caps project:<br>E. Frackowiak, G. Lota, M. Meller, K. Fic,  |
| Optimization of Activated Carbon Electrode for Hybrid Electrochemical Capacitors - 64th Annual Meeting of the International Society of Electrochemistry                                 | Lecture of M. Meller                | 13 Sept 2013    | Santiago de Queretaro, Mexico | WP2        | International meeting<br>Attendees from the Energy Caps project:<br>E. Frackowiak, G. Lota, M. Meller, K. Fic,  |
| Interfacial Phenomena for Capacitive Energy Conversion and Storage - 64th Annual Meeting of the International Society of Electrochemistry   | Lecture of K. Fic                   | 13 Sept 2013    | Santiago de Queretaro, Mexico | WP2<br>WP4 | International meeting<br><br>Attendees from the Energy Caps project:<br>E. Frackowiak, G. Lota, M. Meller, K. Fic,  |
| 5th International Conference on Carbon for Energy Storage/Conversion and Environment Protection –   | Lecture delivered by E. Frackowiak, | 23-26 Sept 2013 | Mülheim a.d. Ruhr Germany     | WP2        | International meeting<br><br>Attendees from the Energy Caps project:<br>E. Frackowiak, D. Gastoł, J. Menzel   |
| Internal SOLVAY EVENT: Inspiring Innovation - Science For Innovation Conference - Optimization of activated carbon electrode for hybrid electrochemical capacitors. In the framework of | Poster presented by F. Gauthy       | 16-17 Oct       | SOLVAY Brussels               | WP2        | Internal meeting<br>Attendees from the Energy Caps project:<br><br>F. Gauthy, P. Degée, N. Deligne, C. Frederix,<br><br>The “Innovation @ SOLVAY” event was held on October 16 - 18 enabled more than |





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| Energy Caps: a FP7 research project aiming at the development of advanced supercapacitors |  |  |  |  | 500 employees from around the world to share their knowledge, skills and projects; |
|---|--|--|--|--|--|

Additionally, during the secondment of V. Khomenko (MER) to SOLVAY, available data dealing with LIC and supercapacitor applications have been reviewed and presented to the marketing team of SOLVAY with the objective to select the most attractive target for the prototyping step. During this survey, a market overview for lithium-ion capacitors (LIC) has been delivered as a background.

It has been found that, on the one hand, the market for supercapacitors is primarily divided between large multinational firms targeting the electronics industry and dedicated capacitor firms focused on large energy storage applications. On the other hand, supercapacitors are still in the relatively early stages of commercialization. However, the technology has begun to move into more mainstream applications, and many supercapacitor firms are displaying growth in sales volumes significantly higher than those of secondary batteries. This trend is expected to continue, as a significant increase in demand is forecasted, spurred primarily by the continued growth in the electric/hybrid electric vehicle and renewable-energy markets.

It appears from this background that the most significant information is the demonstration, in a real application, by a Californian team (ref: NREL/PR-540-47355), that with less weight, supercapacitors perform better than Ni metal hydride batteries in hybrid car currently used in hybrid cars. This comes from the fact that the regenerative braking overall performances are more related to the power than to the energy. As a consequence, the choice to focus the prototyping step to this market was proposed to the consortium and mainly to YUNSAKO at the last consortium meeting. This means to develop electrode/electrolyte materials that will enable an LIC to meet power assist and regenerative braking goals for hybrid vehicle applications. Light electric vehicles could be still another option that should be analyzed/discussed during next secondments.