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Sodium-Ion and sodium Metal BAtteries for efficient and sustainable
next-generation energy storage

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SIMBA – Deliverable Report

<< D4.6 – Demonstration of sustainable binder system
for cathodes and anodes >>

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Publishable summary

CMC/SBR system is the most studied and used water-based binders in electrode manufacturing, which is also selected as the standard binder in the SIMBA baseline cells (BLCs). As a synthetic rubber that is derived from styrene and butadiene, SBR (Styrene-Butadiene Rubber) would preferably be replaced by more ecofriendly and greener binders for a sustainable battery system. This document provides a demonstration of sustainable water-based biopolymers as binders applied in the electrodes, both cathode and anode that are used in BLCs. This work is carried out in collaboration with WP6 to investigate the design for cell recycling, purifying materials waste streams at End of Life (EOL). Three biopolymers, Guar, Carrageenan Iota, Carrageenan Kappa, have been selected and studied with both Prussian White (PW) cathode and Hard Carbon (HC) anode. Compared with the standard CMC/SBR binder system that has been used in BLCs, Guar and Carrageenan Iota give comparable or even better results on various features, such as rheology, manufacturability, adhesion properties, conductivity, capacity and cycle stability. Different characterizations have been carried out to understand the binding mechanisms of these biopolymers. This study will provide possibilities to process electrodes with sustainable binders into SIMBA BLCs.

8 Appendix B- Acknowledgement

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3	UBham	THE UNIVERSITY OF BIRMINGHAM
4	WMG	THE UNIVERSITY OF WARWICK
5	KIT	KARLSRUHER INSTITUT FÜR TECHNOLOGIE
6	CEA	COMMISSARIAT À L'ÉNERGIE ATOMIQUE ET AUX ÉNERGIES ALTERNATIVES
7	IFE	INSTITUTT FOR ENERGITEKNIKK
8	SAS	USTAV ANORGANICKEJ CHEMIE SLOVENSKA AKADEMIA VIED (Institute of Inorganic Chemistry, Slovak Academy of Sciences)
9	FHG	FRAUNHOFER GESELLSCHAFT ZUR FÖRDERUNG DER ANGEWANDTEN FORSCHUNG E.V.
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