



ADEM

innovative energy materials

Annual Report 2017

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2. Preface

ADEM Annual Report 2017

This Annual Report takes a look at activities under the banner of ADEM. ADEM stands for Advanced Dutch Energy Materials. In 2006, ECN; the Energy Research Center of the Netherlands, the Technical University of Delft, the Eindhoven University of Technology, and the University of Twente conceived a plan to materialise energy innovation in a shared ADEM-Innovationlab. In 2009, this research and investment plan for energy innovation received a grant of €30,000,000 from the Ministry of Economic Affairs and Climate Policy. Participating companies together contributed an additional € 3,000,000 in ADEM.

In 2011, ADEM-Innovationlab has been transformed in a green deal Materials for Energy Applications, to ensure that the ADEM research would be focussed on the needs of industry. As a mayor component of the green deal, in 2013, a ADEM Program Council of representatives of the Hightech Systems & Materials Top team and of the Energy Top team and of representatives of participating companies was formed. The Program Council's primary remit is to formulate the needs of industry and subsequently to advise ADEM's Steering Committee on the allocation of resources to research proposals and infrastructural investments. The Ministry of Economic Affairs and Climate Policy is an involved observer in the ADEM Program Council.

This annual report provides an overview of the content and progress of all current ADEM research projects, of projects approved, and of the realized and current investments in the joint research infrastructure, up to the end of the year 2017.

Prof dr. Bernard Dam
Scientific director ADEM
Chair of ADEM's Steering Committee

ADEM Innovation Lab

The Netherlands has an excellent track record in materials research, particularly in (nano-) materials for use in energy conversion devices. This is a broad range of devices, which encompasses electricity generation and storage devices (wind, solar cells, batteries), heat transfer and storage devices, (solar-powered) chemical conversion devices, etc. The ADEM Innovation Lab followed this path in materials research with initially 12 PhD students in 2010, followed in 2011 by 12 others. With the last vacancies filled in 2017, up to a total of 42 PhD students and 5 Postdocs were recruited. From this group 26 students already received their PhD degree (1 in 2013, 4 in 2014, 10 in 2015, 5 in 2016, 6 in 2017), 7 promotions are expected in 2018, and another 6 in 2019. ADEM has 2,5 M€ available for ongoing research and the program will be fully completed in December 2019.

Industrial Participation

Up to now, ADEM has realized 2.5 M€ worth in industrial participation. Another 2.7 M€ has been committed for the coming years. The Ministry of Economic Affairs midterm approval of ADEM's program in 2013 offered the opportunity to start projects in the new Theme Batteries.

Green Deal Materials for Energy Applications

Since 2013, the ADEM Steering Committee submitted all not yet committed projects and investments to the ADEM Program Council. 18 PhD positions, 3 Postdoc positions and 12 investment proposals were evaluated. In nine cases, this led to an advice to amend the proposal and in 11 cases to the request to rewrite and re-submit the proposal in question. The proposal of the Steering Committee to withdraw 3 large investments and to reallocate the funds was endorsed by the Program Council. The Program Council advised on the projects and investment proposals of two newly developed themes; Batteries in 2014 and Wind in 2016. After this phase of critical review and recalibration of the ADEM program, the ADEM Steering Committee consulted the ADEM program council to formulate the programmatic lines of a follow-up to the current ADEM program. The result of this consultation: 'Electrochemical conversion, the key to a sustainable society' has been presented at the ADEM 2017 Conference and will be further developed within the NERA alliance.

Shared Facilities for Materials Research

The ADEM Shared Innovation Lab expanded in the same period to a valuable research infrastructure that allows for the sharing of facilities for research on materials for conversion, storage, and transport of energy. ADEM upgraded an NMR (TU/e), installed a new advanced ion implanter and anneal-oxidation oven (ECN), and an E-Beam evaporation system (ECN). Another 3,5 M€ is granted to a new NMR (TUD), a combinatorial ALD deposition setup (TUD) and a

wind turbine materials research infrastructure (TUD and ECN/WMC). The experimental equipment is presented yearly at the annual ADEM Conference with posters and presentations. Moreover, ADEM installed a Facility Sharing Program that provides researchers a link to advanced materials analysis tools and to the related expertise. The online version is freely accessible; ADEM partners can use the equipment for none or reduced costs.

Annual ADEM Conferences

And last but not least, ADEM has established a consistent series of annual ADEM Conferences, offering a networking platform for involved ADEM researchers and participating industry. ADEM PhD students and Postdocs present their research in posters and pitches.

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In this Annual Report 2017 theme coordinators will give an overview of their theme and PhD students will present ADEM's current research.

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