Electrochemical Conversion and Materials (ECCM)

Tenure Track Call

Science

2019

Call for proposals

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1 Introduction

The goal of this call is strengthening the research field of Electrochemical Conversion and Materials through the introduction of tenure track positions. Prospective tenure track researchers are invited to submit a proposal with support from a suitable host institution.

1.1 Background

Renewable electricity will play a major role in the transition to an energy supply without CO2 emission. This transition is a necessary path towards reaching CO2 neutrality in 2050, as ordained by the Dutch Government. However, switching to CO2-free production of electricity will not be sufficient, as a requirement for carbon-based fuels (by air-, ship- and heavy road transport) and chemical building blocks will remain. Carbon-based fuels and chemical building blocks are still dependent on fossil sources, and are currently responsible for 35% of worldwide CO2 emission (United States Environmental Protection Agency). Producing these fuels and chemicals from biomass and/or CO2 powered by renewable energy is a considerable challenge. Electrochemical conversion will be the key enabling technology towards this transition.

The imbalance between supply and demand of electricity, also called intermittency, is another problem that must be solved before CO_2 neutrality can be achieved. Solutions can be found in connecting networks, adding flexibility to supply and demand, and storage of electricity. Electricity can be stored in batteries (shorter periods and smaller amounts) or by electrochemical conversion to fuels or chemicals. Electrochemical conversion is a promising option as it scales well with increasing energy supply.

The Netherlands prefers to avoid a dependency on other countries for access to these technologies. Moreover, it has the ambition to play a leading role in the worldwide energy transition by international collaboration and through its own research and development. After consultation of experts from industry and academia, the federal advisory committee Electrochemical Conversion and Materials (ECCM)[1], established by the Top Sectors High Tech Systems and Materials (HTSM), Energy and Chemistry, formulates the following goals:

- In 2030, H_2 will be produced for € 2/kg and for € 1/kg in 2050, with low CO_2 emission.
- In 2030, at least 20% of H_2 and NH_3 will be produced without CO_2 emission.
- In 2050, at least 40% of the CO_2 produced by industry will be reused as a resource in a circular carbon cycle.
- In 2050, the entire transport sector has reached CO_2-neutrality

To turn these ambitions into reality, the committee advises to focus on three areas:

1. Integration of electrolysis and sustainably produced H2 in large scale industrial processes;
2. Large-scale development of innovative electrochemistry and related materials science;

[1] The Advisory Committee on Electrochemical Conversion & Materials (ECCM) advises the Dutch government on making the transition to a CO2-neutral industry based on intermittent sustainable energy generation, storage and conversion. The committee was set up by the Top Sectors HTSM, Energy and Chemistry. From a national perspective, the Committee advises the government on what efforts are needed for cooperation across the entire innovation chain. In addition, the Committee is in the process of building up an ECCM community of knowledge institutions, companies, governments and NGOs. For furhter infirmation please visit : www.co2neutraalin2050.nl.http://www.co2neutraalin2050.nl/

3. Add focus and invest in education and knowledge exchange.

In order to contribute to these goals, NWO has committed to a public-private programme within the Knowledge and Innovation Contract for 2018-2019 that will create tenure-track positions in the research field that encompasses Electrochemical Conversion and Materials. This call is a contribution to research in the Top Sectors Energy, HTSM and Chemistry. The private partners are Tata Steel, Nouryon and Shell. They contributed to this call financially and are represented in the programme committee.

Programme committee. The NWO Domain Science Board has appointed a programme committee to advise about the thematic demarcation of this programme and to contribute to the monitoring and supervision of the projects awarded funding. The committee is composed of researchers from the ECCM domain, a representation from each of the private partners, and a member from Responsible Innovation (MVI) research.

Responsible Innovation (MVI). To ensure that the research within ECCM will lead to responsible innovations with broad societal support, NWO encourages research into the ethical and societal aspects (such as legal, sociological, economic and psychological aspects) of technological and other innovations. NWO has developed the Responsible Innovation (MVI) approach to this end. By ascertaining as early as possible which aspects play a role and what the impact of the innovation is on the stakeholders involved, due consideration can be given to these aspects during the design phase. Researchers from the humanities, social sciences and natural sciences work together and jointly approach an issue from the perspective of their different areas of expertise. For further information about the MVI approach, see Annexe 6.1 and the website: www.nwo-mvi.nl.

NWO shall integrate the research proposals awarded funding in the ECCM call with MVI research. The research proposal for this ECCM Tenure Track call should contain a section in which it is described how you will incorporate the research into the societal and ethical aspects from the start of your research. The quality of this section is an assessment criterion for this call. After granting, a compulsory matchmaking will be organised with MVI experts for the purpose of further elaborating this MVI section. Additional funding for the elaborated MVI section will be made available (for personnel costs for which the amount can range from 100,000 to 250,000 euros) via a separate MVI top-up grant. Please note that this grant cannot be applied for in this call for proposals but will be made available by means of a separate call. Successful applicants for this Tenure Track call are also required to submit an application for the MVI top-up grant. The separate call for proposals for the MVI top-up grant will be published in good time. For further information on this subject, please contact Marlies van de Meent (m.vandemeent@nwo.nl).

1.2 Available budget

The NWO budget available for this call is 5,745,000 euros.

1.3 Validity of the call for proposals

This call for proposals is valid until the closing date on 21 November 2019 at 14:00 hours CE(S)T.

2 Aim

Proposals should address research questions in the main five research focus areas in the Electrochemical Conversion and Materials domain, as specified below. The areas and a number of related key challenges are described to provide guidance, but proposals addressing other challenges in the same main areas are also welcomed, if well motivated. Applicants are encouraged to address multiple focus areas. Proposals are also expected to have a potential impact in a relevant industrial application area, including: water electrolysis, CO2/CO reduction, N2 reduction, electrosynthesis, redox flow batteries, electrolysers, fuel cells, system integration, waste stream recycling. Other application areas are welcomed if well motivated.

ECCM Research areas

1. Fundamentals

This research area is aimed at increasing our fundamental understanding of electrochemical processes. Proposals in this area do not have to be aimed at a particular application area, but should show how the research advances the field of electrochemistry as a whole.

- Modelling of electrochemical interfaces and electrocatalytic materials (density functional theory, multi-scale modelling);
- Fundamental experiments at electrochemical interfaces and electrocatalysis (e.g. single crystals, nanoparticles, gas bubble formation at electrodes);
- Operando and in-situ (nanoscale) characterization techniques (STM, SECM, X-Ray, in situ TEM, FTIR, etc.);
- Transport through electrochemical interfaces.

2. Materials for Electrochemistry

Emerging (photo)electrochemical applications put strong requirements on materials, e.g. for electrodes, membranes, porous separators and gas-diffusion materials, in terms of controlled mass transport, reduction of crossover, conversion rates and integration of different materials.

- Highly active, selective and stable electrode materials (small and large scale);
- New approaches for materials selection, characterization and integration (i.e. integrated membrane electrode assemblies);
- Scalable fabrication of advanced micro-/nanostructured thin films and multi-layer 3D architectures for electrochemical applications;
- Ion-exchange membranes resistant to extreme conditions (e.g. acidic or alkaline environment, high temperature, high pressure);
- Monovalent selective ion exchange membranes;
- Ionomers, porous separators and gas-diffusion materials for electrochemical applications.

3. Cell design/Electrochemical engineering

This research area aims to improve cell and stack design for particular application areas through increasing our understanding of the processes that take place at cell level.

- Design and characterisation of cells and stacks (membrane electrode assemblies, 3D electrodes, gas diffusion electrodes, bipolar plates);
- Modelling of mass, heat and current transport and gas-liquid flows in electrochemical cells and stacks (using e.g. computational fluid dynamics, Maxwell-Stefan, Nernst-Planck);

- Experimental characterisation of cells using electrochemical techniques, high speed cameras, X-ray, mass spectroscopy, etc.;
- Design and characterisation of electrochemical cells that can operate at high temperature, pressure and current density, taking into account material limitations.

4. Electrochemistry under industrial conditions, system integration and system engineering

This topic links closely to the field of cell design/electrochemical engineering and takes the next steps towards industrial application. In this topic proposals are invited to address electrochemistry under industrial conditions and/or system and system integration aspects. For scaling up to industrial conditions, the aim is to find the best conditions for a particular application area, taking into account boundary conditions such as impurities in raw materials and desired pressure levels of end products. Many challenges need to be overcome to realise the potential for large scale electrification of the chemical process industry. It needs to be evaluated which aspects of existing plants would benefit from electrification, and how to integrate individual electrochemical processes with classical catalysis steps. Taking these system level aspects into consideration, guidelines should be developed to accelerate engineering of electrochemical systems that go beyond catalyst/material optimisation.

The identified challenges include:

- Bringing materials from lab to industry: (accelerated) testing at industrial conditions (strong electrolytes, increased temperatures and pressures) and in situ and ex situ characterisation of these materials;
- How to deal with intermittency of renewable electricity supply (i.e. system turns on/off, or need for buffering at a lower capacity);
- Role of electrolysis in a future power system based on renewable energy (i.e. which steps in an overall conversion would benefit from electrification);
- System integration (with CO2 capture, up and down stream processing, full system analysis, etc.);
- Integration with both direct air capture of CO2, and CO2 from point sources (waste stream, blast furnace gas, etc.);
- Life cycle analysis and technoeconomic analysis of electrochemical technologies;
- Device/system design and development.

5. Novel approaches

The electrification of society requires the development of alternative electrochemical processes and new sources to drive such processes. Below is a non-exhaustive list, novel approaches are specifically encouraged:

- System and control theory for dynamics of electrochemical interfaces, cells and systems (Integrated modelling);
- Energetically (e.g. light, microwaves, plasma, plasmon, ultrasound) stimulated electrochemistry;
- Novel optical/nanophotonic/plasmonic methods for enhancement and in-situ/operando characterisation of electrochemical performances;
- Alternative electrochemical processes and systems;
- Electrochemical processes for extreme conditions (e.g. acidic, alkaline, high T, high P);
- New methods for physical and chemical characterization of transport and conversion in electrochemical systems.

3 Guidelines for applicants

3.1 Who can apply

Proposals can be submitted by applicants from the Netherlands or abroad who have obtained their PhD (i.e. postdocs) and want to apply for a new tenure track position. The successful applicants will be employed at one of the following research institutes:

- Dutch universities;
- University medical centres;
- NWO and KNAW institutes;
- the Netherlands Cancer Institute;
- the Max Planck Institute for Psycholinguistics in Nijmegen;
- researchers from the DUBBLE Beamline at the ESRF in Grenoble;
- NCB Naturalis;
- Advanced Research Centre for NanoLithography (ARCNL);
- Princess Máxima Center;
- Royal Netherlands Meteorological Institute;

Each applicant may submit a single proposal only.

3.2 What can be applied for

The budget is built up using the NWO-wide standardised building blocks, the so-called modules. These modules are described below. In the proposal budget, applicants choose which combination of modules are needed to answer the research question and how often each module will be deployed. In this call, a module to request funding for a Tenure Track Researcher is available as well. The module for a Tenure Track Researcher should be requested at least once.

The following modules are available for an application within this round:

1. Module Personnel: Tenure Track Researcher; a) PhD/PDEng/MD PhD; b) Postdoc; c) Non Scientific Personnel; f) Other scientific personnel; NB: Remunerations for PhD scholarship students at a Dutch university are not eligible for funding from NWO.

• Module Tenure-Track Researcher

The maximum amount assumed for the funding of a tenure-track position is for a senior scientific employee from the applicable VSNU salary tables from the ‘Agreement for Funding Scientific Research’, including the individual bench fee of € 5000. If that maximum is exceeded, then the extra amount should be covered by the host institution. It is assumed that a tenure-track researcher will be appointed for a maximum of 60 months for 1.0 fte. A part-time equivalent of 60 full months is also possible but must be for a minimum of 0.8 fte.

If the tenure-track researcher does not spend more than 25% of the appointment on secondary tasks (education/government/management) and spends the other 75% on research, then the costs of this position may be fully applied for. If the tenure-track researcher spends more than 25% of the appointment on secondary tasks, then only the portion of the appointment devoted to research may be charged to the grant.

The salary costs will be remunerated according to the 'Agreement for Funding Scientific Research' made with the Association of Universities in the Netherlands (for ZonMw, the costs are based on the collective labour agreement of the Netherlands Federation of University Medical Centres).

• Module 1c) Non-scientific personnel

For the appointment of non-scientific personnel, specifically needed for the research project which funding is applied for, a maximum of € 100,000 can be requested with this module. This can concern personnel such as student assistants, programmers, technical assistants, analysts, et cetera. This module can only be applied for in combination with modules 1a and/or 1b.

The minimum size of the appointment is 0.5 fte for 12 months. The minimum appointment can be spread over a longer period of time. If the applicants wish to deploy expertise for a shorter period of time, then the material credit can be used for this.

Salary costs are dependent on the level and are remunerated in accordance with the agreements in the most recent 'Agreement for Funding Scientific Research' made with the Association of Universities in the Netherlands and are based on the collective labour agreement of the Dutch universities.

• Module 1f) Other scientific personnel

Budget for other scientific personnel such as university graduates, graduate physicians and graduate physicians training to be specialists that are needed for the research project that funding is requested for. This module can only be applied for in combination with module 1a and/or 1b. The maximum period of appointment is 48 months for 1 fte and 60 months for a part-time appointment. The minimum size of the appointment is 0.5 fte for 12 months. This deployment can be spread over a longer or shorter period, for example across the entire duration of the project.

2. Module Material credit

A maximum of € 15,000 per year per full-time scientific position (modules 1a, 1b and/or 1d) can be applied for, specified according to the three categories stated below:

Project-related goods/services

- consumables (glassware, chemicals, cryogenic fluids, etc.);
- equipment and/or software (e.g. lasers, specialist computers or computer programs, etc.);

For these small items of equipment and/or software, the amount may not amount to more than € 160,000 per application.

- measurement and calculation time (e.g. supercomputer access, etc.);
- costs for acquiring or using data collections (e.g. from Statistics Netherlands);
- access to large national and international facilities (e.g. cleanrooms, synchrotrons, datasets, etc.);
- work by third parties (e.g. laboratory analyses, data collection, etc.);
- personnel costs smaller in size than those offered in Module 1.

Travel and accommodation costs (for the employees for which a personnel grant was requested in Modules 1a and 1b)

- travel and accommodation costs (national and international);
- congress visits (max. 2 per year);
- fieldwork;

  work visits.

Implementation costs
- national symposium/conference/workshop organised by the project;
- costs of open access publishing;
- data management costs;
- recruitment costs (incl. advertisement costs);
- costs involved in applying for licences (e.g. for animal experiments).

Costs that cannot be applied for are:
- basic facilities within the institution (e.g. laptops, desks, et cetera);
- maintenance and insurance costs.

If the maximum amount of € 15,000 per year per full-time scientific position is not sufficient for realising the research, then it may be deviated from if a clear justification is provided in the proposal. The only exception to this is the amount for small equipment (€ 160,000).

3. Module Investments up to the lower limit of Investment Grant NWO Large

In this module, funds can be requested for investments in scientifically innovative equipment and data collection of national and international importance. You must extensively specify and justify the costs for investments.

Funding can be requested for:
- costs for investments in scientific equipment and datasets;
- personnel costs for the setting up of databases and the initial digitisation for the bibliographic equipment if this cannot be purchased;
- personnel costs for employees with a specific and vital technical expertise needed for the development or construction of an investment.

If funding is requested to cover personnel costs, then it must be justified why these personnel costs are necessary, why the facility concerned cannot be purchased, and why the necessary personnel expertise cannot be hired elsewhere against comparable costs.

Funding cannot be requested for:
- costs for infrastructural facilities that can be attributed to the standard infrastructure;
- data collections and any possible associated software and bibliographies that are already available through other means (see for this material costs);
- other personnel costs, including personnel costs for the exploitation of the facility and the research carried out using it;
- maintenance and use of the equipment; the costs for the use of equipment by the researchers that are appointed to the project can be requested via the material costs module.

The amount requested from NWO may not be more than € 500,000. The minimum of the amount invested in total is € 160,000 for equipment and for data collections the lower limit is € 25,000. The institution must contribute at least 25% of the costs for the investment.

4. Module Valorisation/Impact: a) Knowledge Utilisation

Module 4a) The aim of this module is to facilitate the use of the knowledge that emerges from the research. The contribution requested may be no more than € 25,000 and must be specified.

As knowledge utilisation can assume very different forms in the various scientific disciplines, it is up to the applicant to specify which costs are needed, for example for producing an educational package or realising a feasibility study into application possibilities, or the costs of submitting a patent application. For further information about knowledge utilisation, please see: https://www.nwo.nl/beleid/kennisbenutting.

5. Module Internationalisation: a) Internationalisation; b) Money follows Cooperation

• Module 5a) Internationalisation

The aim of this module is to encourage international collaboration. The contribution requested may be no more than € 25,000. The amount requested must be specified. If the maximum amount is not sufficient for realising the research, then it may be deviated from if a clear justification is provided in the proposal.

Funding can be requested for:

- travel and accommodation costs insofar as these are direct research costs that emerge from the international collaboration and for additional costs that are not covered in a different manner, for example from the bench fee. For an overview of the fixed maximum prices per country, see the listings of the Dutch government: | https://www.rijksoverheid.nl/documenten/besluiten/2018/04/01/tarieflijst-logies--en-overige-kosten-bij-dienstreizen-buitenland-per-1-april-2018
- travel and accommodation costs for foreign guest researchers
- costs for the organisation of international workshops/symposia/scientific meetings.

• Module 5b) Money follows Cooperation (MfC)

The aim of this module is to encourage international collaboration via the principle of Money follows Cooperation, for which the national research budget is used for cross-border collaboration that offers the possibility to create added value for individual research projects by deploying expertise from abroad which is not available in the Netherlands at the desired level for the project. This concerns expertise from organisations outside of the Netherlands that have a public task and carry out research independently. In the proposal, the applicant must convincingly demonstrate that the expertise concerned is not available in the Netherlands. This will be assessed in the selection process. If the arguments are not sufficiently convincing, then the funds for this module cannot be made available.

Furthermore, the applicant needs to state the amount to be deployed for this module in the budget. In principle, there is no limit to the amount that can be requested.

3.3 When can applications be submitted

The deadline for the submission of proposals is **November 21, 2019**

When you submit your application to ISAAC you will also need to enter additional details online. You should therefore start submitting your application at least one day before the deadline of this call for proposals. Applications submitted after the deadline will not be taken into consideration.

3.4 Preparing an application

- Download the application form from the electronic application system ISAAC or from NWO's website (on the grant page for this programme).
- Complete the application form.
- Save the application form as a pdf file and upload it in ISAAC.

3.5 Conditions on granting

The NWO Grant Rules 2017 and the Agreement on the Payment of Costs for Scientific Research apply to all applications.

An application for a tenure-track position must be accompanied by a statement from the dean of the faculty or the director of the institute where the tenure-track researcher will receive an appointment. From the declaration, it must be apparent that the candidate has a realistic prospect of a tenured appointment as well as which career perspectives the researcher will be offered. The tenure-track position must be a route to tenure: a temporary position that, if that researcher performs well, will lead to a tenured position, a permanent job. Tenure may not depend on the availability of funds, functioning of other candidates, et cetera. It should also be apparent from the declaration that the university or the institute will act as much as possible in the spirit of the '10 golden rules for a successful and consistent tenure-track policy in the Netherlands' A copy of these 10 golden rules will be available with this call for proposals.

The tenure-track researcher to be appointed may not have worked as a 'senior researcher' (i.e. either assistant, associate or full professor, tenure-track researcher, or comparable appointment) before 21 June 2019. This means that the researcher may be employed at the intended institute, for example via a temporary postdoc contract. As such, the tenure-track researcher may be appointed at the employer's risk from 21 June 2019 onwards.

After granting, all successful applicants will be invited for a mandatory matchmaking event with MVI experts in order to prepare the MVI top-up grant. Successful applicants are obliged to submit an application for the MVI top-up grant.

3.5.1 Project budget and duration

All applications have a maximum duration of 6.25 years. The minimum duration is the same as the duration of the Tenure Track Researcher position applied for. Applications with a shorter duration or a longer duration than stated here will not be considered by NWO.

The amount that can be applied for is at least € 650,000 and at most € 950,000, excluding the MVI top-up grant. Applications with a lower of higher budget than stated above will not be considered by NWO.

Open Access

All scientific publications resulting from research that is funded by grants derived from this call for proposals are to be immediately (at the time of publication) freely accessible worldwide (Open Access). There are several ways for researchers to publish Open Access. A detailed explanation regarding Open Access can be found on www.nwo.nl/openscience-en.

Data management

Responsible data management is part of good research. NWO wants research data that emerge from publicly funded research to become freely and sustainably available, as much as possible, for reuse by other researchers. Furthermore NWO wants to raise awareness among researchers about the importance of responsible data management. Proposals should therefore satisfy the data management protocol of NWO. This protocol consists of two steps:

1. Data management section

The data management section is part of the research proposal. Researchers should answer four questions about data management within their intended research project. Therefore before the research starts the researcher will be asked to think about how the data collected must be ordered and categorised so that it can be made freely available. Measures will often need to be taken during the production and analysis of the data to make their later storage and dissemination possible. Researchers can state which research data they consider to be relevant for storage and reuse.

2. Data management plan

After a proposal has been awarded funding the researcher should elaborate the data management section into a data management plan. The data management plan is a concrete elaboration of the data management section. In the plan the researcher describes whether use will be made of existing data or a new data collection and how the data collection will be made FAIR: Findable, Accessible, Interoperable, Reusable. The plan should be submitted to NWO via ISAAC within a maximum of 4 months after the proposal has been awarded funding. NWO will approve the plan as quickly as possible. Approval of the data management plan by NWO is a condition for disbursement of the funding. The plan can be adjusted during the research.

Further information about the data management protocol of NWO can be found at www.nwo.nl/datamanagement.

Nagoya Protocol

The Nagoya Protocol became effective on 12 October 2014 and ensures an honest and reasonable distribution of benefits emerging from the use of genetic resources (Access and Benefit Sharing; ABS). Researchers who make use of genetic sources from the Netherlands or abroad for their research should familiarise themselves with the Nagoya Protocol (www.absfocalpoint.nl). NWO assumes that researchers will take all necessary actions with respect to the Nagoya Protocol.

3.6 Submitting an application

An application can only be submitted to NWO via the online application system ISAAC. Applications not submitted via ISAAC will not be taken into consideration.

A principal applicant must submit his/her application via his/her own ISAAC account. If the principal applicant does not have an ISAAC account yet, then this should be created at least one day before the application is submitted to ensure that any registration problems can be resolved on time. If the principal applicant already has an NWO-account, then he/she does not need to create a new account to submit an application.

When you submit your application to ISAAC you will also need to enter additional details online. You should therefore start submitting your application at least one day before the deadline of this call for proposals. Applications submitted after the deadline will not be taken into consideration.

For technical questions please contact the ISAAC helpdesk, see Section 5.2.1.

4 Assessment procedure

4.1 Procedure

The first step in the assessment procedure is to test whether an application is admissible. Only those proposals that satisfy the criteria stated in Chapter 3 are admissible and will be taken into consideration.

Up to and including 30 June 2019, the NWO Code of Conduct on Conflicts of Interest applies to all persons and NWO employees involved in the handling, assessment and/or decision-taking process. On 1 July 2019, this Code of Conduct will be replaced by the new Code for Dealing with Personal Interests. From 1 July 2019, the assessment and/or decision-taking process for this funding round will therefore be carried out according to the Code for Dealing with Personal Interests. More information concerning the Code for Dealing with Personal Interests can be found on the NWO website.

4.1.1 Assessment committee

Applications that have been submitted are evaluated by an international assessment committee ('the committee'). The committee consists of experts in the field of Electrochemical Conversion and Materials and experts on MVI. The committee will be established by the NWO Domain Science Board.

4.1.2 Assessment procedure

The assessment procedure involves the following steps:
- NWO assesses the applications in terms of their admissibility.|
- All eligible candidates are invited for an interview.
- Before the interview, the committee assesses the applications by reference to the criteria (see section 4.2) and then ranks them according to their chances of success.
- The committee then assesses the applications of the interviewed applicants anew on the basis of the application and the interview and ranks them in accordance with the assessment criteria.
- Based on the committee's advice, the NWO Domain Science Board decides on the award of funding.

4.1.3 Interview

The applicant introduces himself or herself and then presents the research proposal to the committee. After the presentation, the committee has the opportunity to pose questions based on the application and the presentation. The candidate can respond to these questions in the discussion with the committee. With this approach a hearing and rebuttal takes place.

4.1.4 Ranking

On the basis of the interviews and applications, the committee ranks the researchers. The highest ranked proposals are then nominated for funding.

4.1.5 NWO Domain Science Board takes decision based on the advice of the committee.

Data management

The data management section in the application is not evaluated and therefore not included in the decision about whether to award funding. However, both the referees and the committee can issue advice with respect to the data management section. After a proposal has been awarded funding, the researcher should elaborate the data management section into a data management plan. Applicants can use the advice from the referees and the committee when writing the data management plan. A project awarded funding can only start after NWO has approved the consortium agreement.

Qualification

NWO will award a qualification to all full proposals and will make this known to the researcher with the decision about whether or not the application has been awarded funding.

Only applications that receive the qualification "excellent" or "very good" will be eligible for funding. For more information about the qualifications please see www.nwo.nl/en/funding/funding+process+explained/nwo+qualification+system.

21 November 2019	Submission deadline proposals
January 2020	Interviews
January 2020	Committee meeting
February 2020	Decision NWO Domain Science Board
March 2020	NWO informs applicant about the decision
MVI Top-up procedure	
From March 2020 onwards	Mandatory matchmaking event for MVI, followed by mandatory submission and evaluation of MVI top-up applications

4.2 Criteria

All proposals will be assessed on the criteria listed below:

Quality and innovative character of the proposed research (25%)
- Clarity of the proposal: articulation of the problem, the objectives, and the approach;
- Scientific innovativeness of the proposed research;
- Novelty, effectiveness and feasibility of the proposed approach;
- Appropriateness of the proposed equipment, and if applicable: access to required equipment.

Quality of the researcher (25%)
- Academic excellence; demonstrated by e.g. the PhD thesis, high-quality publications and/or other scientific achievements;
- Relevance of the expertise for the proposed research;
- Capability to generate innovative ideas and to independently develop these;

Added value, impact and embedding (50%)
- Added value to the Dutch ECCM research landscape and the host institute: fit and motivation of fit

within the scope of the call and within the strategy of the host institution, including, if applicable, fit[2] within the 'sectorbeeld' (sector outlook) focus areas of the host institution;
- Knowledge utilisation: possible use and relevance of the knowledge generated in other scientific disciplines and/or society (economic, technical, social or cultural, for example via outreach) with particular focus on potential for industry collaboration;
- Quality of the Responsible Innovation (MVI) aspects: the manner in which the proposed research addresses and integrates Responsible Innovation.

Since 2009, NWO has pursued a concrete policy that aims to stimulate the transfer of knowledge generated with the help of funding from NWO. This transfer can take place to other scientific disciplines as well as to users outside of science (industry/society). The knowledge utilisation policy is mainly targeted at increasing researchers' awareness of knowledge utilisation. NWO therefore requests all researchers applying for funding to provide an explanation regarding the possible knowledge utilisation of their project by means of answering several questions (for example: how will knowledge utilisation be implemented and how does the researcher intend to facilitate knowledge utilisation?). This explanation is one of the assessment criteria.

During the assessment, attention is paid to:
- a realistic representation of the knowledge utilisation possibilities (or the lack of possibilities);
- the extent to which the action plan is made tangible with respect to knowledge utilisation.

NWO realises that the possibilities for knowledge utilisation differ per discipline and that some research projects have few if any opportunities for (direct) knowledge utilisation. In this case, an applicant should explain why no knowledge utilisation can be expected for his or her project. The selection committee members will still be asked to assess this explanation: if they are convinced that the research project indeed has no knowledge utilisation possibilities and that the applicant has satisfactorily explained this, then this should not negatively influence the overall assessment score.

For examples of knowledge utilisation, please see: www.nwo.nl/en/policies/knowledge+utilisation.

[2] It is up to the applicant and host institution to show that the proposed research fits in the strategy of the institution and is compliant with the sectorbeeld. To support their claim they may provide English translations of the relevant paragraphs of the Sectorbeeld (which is in Dutch and can be found here.)

5 Contact details and other information

5.1 Contact

5.1.1 Specific questions

For specific questions about Electrochemical Conversion and Materials (ECCM) and this call for proposals please contact:

Dr. B. (Bas) van Schooten
tel.: +31(0)70 349 41 97
E-mail: eccm@nwo.nl

5.1.2 Technical questions about the electronic application system ISAAC

For technical questions about the use of ISAAC please contact the ISAAC helpdesk. Please read the manual first before consulting the helpdesk. The ISAAC helpdesk can be contacted from Monday to Friday between 10:00 and 17:00 hours CE(S)T on +31 (0)20 346 71 79. However, you can also submit your question by e-mail to isaac.helpdesk@nwo.nl. You will then receive an answer within two working days.

6 Annexe(s)

6.1 Examples of Responsible Innovation (MVI)

Examples of responsible innovation challenges that are relevant to research on electrochemical conversion include, but are not limited to:

- Improving societal embedding and acceptability of electrochemical technology
- Participatory modelling to support public and private organisation in exploring robust investment strategies
- Stakeholder and public engagement and collaboration
- Addressing governance and coordination challenges related to system integration and implementation of electrochemical technology
- Social and institutional innovation
- Strengthening innovation network/ecosystem development
- Developing sustainable business models.

Examples of MVI subjects:

Rare metals

Many current catalysts contain rare metals (platinum, palladium etc.). Other metals can be used as an alternative (such as iron). Besides technical considerations, societal and ethical issues play a role. We depend on a limited number of countries for the supply of rare metals. The conditions under which these metals are extracted are often highly polluting and bad for both the environment and public health. How can these societal aspects be included in the design of catalysts?

Collaboration for system integration

Large-scale generation of wind power on the North Sea offers opportunities for making chemical processes in the Rotterdam port area more sustainable. Power can be converted into hydrogen, which can be used to reduce the consumption of fossil-based hydrogen, or used directly in industrial processes in which electrification takes place. However, this transition is so complex and is associated with so many uncertainties that transmission system operators for gas, hydrogen and electricity as well as companies in the port area find it hard to make investment decisions. How can parties collaborate to achieve better agreement? How can they be assisted to explore future scenarios and reduce uncertainties?

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Visiting address:
Laan van Nieuw Oost-Indië 300
2593 CE The Hague
The Netherlands
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