RSC **SRC**

The Royal Society of Canada — La Société royale du Canada
The Academies of Arts, — Les Académies des arts,
Humanities and Sciences — des lettres et des sciences
of Canada — du Canada

ACADEMY OF SCIENCES
APPLIED SCIENCES & ENGINEERING DIVISION
DIVISION COMMITTEE FOR THE SELECTION OF NEW FELLOW
REPORT OF THE COMMITTEE - 2022

Date: March 11, 2022

1. Committee members:
   1) Federico Rosei – Institut national de la recherche scientifique - Chair
   2) Simaan Abourizk – University of Alberta
   3) Cristina Amon – University of Toronto
   4) Pierre Berini – University of Ottawa
   5) Robert Boily - Inforex
   6) Zhongwei Chen – University of Waterloo
   7) Reza Iravani – University of Toronto
   8) Eugenia Kumacheva – University of Toronto
   9) Jian Pei – Simon Fraser University
   10) Hosahalli Ramaswamy – McGill University
   11) Raj Rangayyan – University of Calgary
   12) Kerry Rowe – Queen's University
   13) Sherman Shen – University of Waterloo
   14) Howard Wheater – University of Saskatchewan
   15) Ke Wu – Ecole Polytechnique de Montréal
   16) David Zhang – Chinese University of Hong Kong

2. Number of files reviewed by the committee: **69** (including 8 International candidates)

3. List of candidates recommended for election in alphabetical order:
   - Roussos Dimitrakolpoulos – McGill University
   - Janet Elliott – University of Alberta
   - Gabor Fichtinger – Queen's University
   - Carl Haas - University of Waterloo
   - Jiawei Han – University of Illinois at Urbana
   - Anita Layton – University of Waterloo
   - Ian Moore – Queen's University
   - Catherine Mulligan – Concordia University
   - Satya Prakash – McGill University
   - Marc Rosen – Ontario Tech University
   - Mohamad Sawan – Ecole Polytechnique de Montréal

- David Sinton – University of Toronto
- Wen Tong – Huawei Technologies Canada

4. List of International candidates recommended for election:
   - Gordana Vunjak-Novak – Columbia University

5. Suggestions/Comments regarding the nomination process:

Due to the phasing out of several committee members, at the outset there was only one woman left. Various efforts to recruit additional women from the ASE Division on the committee were not successful. Some did not respond, while most declined as they are too busy at this time. Some indicated that they may be available next year. Eventually one member from the Division of Mathematical and Physical Sciences, Eugenia Kumacheva of the University of Toronto, was invited to join the committee improve gender balance. She was also chosen due to the closeness of her studies to the field of ASE (materials chemistry).

Due to the relatively high number of nominations (69, second highest among all of the RSC's divisions in 2022) the committee first sorted the candidates for regular fellowship into three subcommittees: (i) Mechanical, Civil, Environmental and Mining Engineering; (ii) Computer Science, Applied Mathematics, Electronics and Telecommunications Engineering; (iii) and Biomedical, Chemical and Materials Engineering. These subcommittees were tasked with recommending a list of up to 10 candidates from their share of nominees, that would be put forward to a final plenary session vote where all committee members would evaluate all shortlisted candidates.

Because of the tight schedule and short deadlines, some members were not able to join the final plenary session. Additional members were invited to participate in this final meeting, to provide a more complete evaluation and discussion of the shortlisted candidates, based on areas of expertise that were underrepresented following the retirement of some committee members: Pierre Berini (U Ottawa), Hosahalli Ramaswamy (McGill) and Kerry Rowe (Queen's).

In summary, Federico Rosei, Simaan Abourizk, Cristina Amon, Pierre Berini, Robert Boily, Zhongwei Chen, Jian Pei, Hoshalli Ramaswamy, Raj Rangayyan, Kerry Rowe, Serman Shen and Ke Wu attended the plenary meeting. Those who attended their subcommittee meetings were Federico Rosei, Simaan Abourizk, Robert Boily, Zhongwei Chen, Reza Iravani, Jian Pei, Raj Rangayyan, Sherman Shen, Howard Wheater, Ke Wu and David Zhang.

One of the first issues raised in the selection process was that of non-academic candidates (i.e. those working in Industry or in National labs) and how to properly assess them. This seems to be a recurring issue, which is probably specific to the ASE division, at least with respect to industry candidates. The committee wished to ensure that such candidates also had a fair evaluation towards election in the RSC.

For such nominees, it is apparent that not all criteria that are typically used for ranking are relevant: for example, candidates from industry may have a substantial patent portfolio as opposed to publications, and training students would not be part of their job description.

Nevertheless, there is an expectation that these candidates should meet other standards that the regular, academic candidates do: for example, they should be Fellows of one or more learned societies, if pertinent they should be members of one or more major Engineering academies, their references should be from other important contributors from their field with prominent international stature (e.g. they should be themselves national academy members or higher).

The title of "FRSC" should be considered as pinnacle distinction, not as a stepping stone towards other honours. One member also asked that evaluation criteria be weighted (e.g. 30% towards publication metrics, 20% towards social impact, etc.) however this was not adopted for this year since the subcommittees had already begun their evaluations with the expectation that candidates would follow a

simple ranking (1-10). Furthermore, such a breakdown would require prior discussion among the committee members to determine the exact weighting for each of the criteria.

The committee also raised the need to have CVs be more standardized as some candidates had poorly-structured CVs which made them difficult to evaluate, despite all other indicators supporting the otherwise excellent work of the candidate: a poor CV may sink some otherwise great candidates and the committee would like to help minimize this issue with a standardized CV template for nominations. Such a standardization would likely also save time.

Some members also requested that the composition of the committee should be confirmed sooner, ideally before the nomination deadline, so that committee member may avoid putting themselves in conflict of interest with too many candidates by writing letters of support for multiple candidates (this impacted at least one committee member in particular this year).

Though a slightly minor concern, there was still some questioning about the citizen/permanent residence status of one candidate. While it was finally determined that he would be allowed to be evaluated as a regular candidate, generally speaking, the committee would like to see more explicit confirmation that a candidate is a Canadian citizen/permanent resident, particularly if they have spent most of their life and career outside of Canada.

One suggestion made by a committee member was that, should the subcommittee evaluation process persist in future years, that each subcommittee's top three candidates (this suggestion was revised during the plenary committee to just the top two candidates) be automatically considered as A-candidates, which would leave just 2 A-candidates and 3 B-candidates to be discussed at the plenary session. While not discounted outright, it was agreed that because this suggestion was proposed in the middle of this year's evaluation process, it would be unfair to the other subcommittees who were operating under different assumptions, so this idea would have to be revisited and approved by next year's committee before they start their evaluations. In addition, such a process may not be entirely fair, as these top candidates would essentially end up on the ballot after being endorsed by a small committee of 3-4 Fellows and in addition, from a statistical point of view this may also not be sufficiently robust, due to the small numbers involved in the subcommittees.

During the plenary session there was a fairly long introductory discussion and lengthy debates on how to finalize the A and B lists. Part of these discussions also involved EDI. Broadly speaking the majority of the committee members were pleased with the final outcome, in which two women are on the A list (Elliott, Mulligan) and one is on the B list (Layton). In addition, there is also a female international candidate (Vunjak-Novak).