



SPECIAL EDITION – 45 YEARS OF THE REVISTA BRASILEIRA DE APLICAÇÕES DE VÁCUO

EDIÇÃO ESPECIAL – 45 ANOS DA REVISTA BRASILEIRA DE APLICAÇÕES DE VÁCUO

Mariana Amorim Fraga^{1,*} , Diego Alexandre Duarte² , Felipe Carneiro da Silva³ , Luciana Sgarbi Rossino⁴
Julio César Sagás⁵

1. Universidade Presbiteriana Mackenzie – Escola de Engenharia – São Paulo (SP), Brazil.

2. Universidade Federal de Santa Catarina – Centro Tecnológico de Joinville – Departamento de Engenharias da Mobilidade – Joinville (SC), Brazil.

3. Centro Estadual de Educação Tecnológica Paula Souza – São Paulo (SP), Brazil.

4. Faculdade de Tecnologia de Sorocaba – Sorocaba (SP), Brazil.

5. Universidade do Estado de Santa Catarina – Centro de Ciências Tecnológicas – Departamento de Física – Joinville (SC), Brazil.

Corresponding author: mariana.fraga@mackenzie.br

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In recent decades, vacuum technologies have played an important role in strategic areas of science and industry, driving advances in materials, manufacturing, and scientific instrumentation.¹ Vacuum-based processes, such as physical and chemical vapor deposition of thin films, materials processing, thermochemical treatments, and plasma techniques, have become essential to sectors including microelectronics,² optoelectronics,³ energy,⁴ tribology,⁵ and biomedical applications.⁶ The growing demand for functionalized surfaces, high-precision devices, and high-performance materials has expanded the use of high- and ultra-high-vacuum systems, which ensure process purity, chemical control, and stability. Furthermore, the development of vacuum metrology standards and the rise of emerging technologies, such as advanced surface engineering and new semiconductor processes, have consolidated vacuum technology as a key element of contemporary innovation.¹

In this context, it is with great pleasure that we present to readers this special edition celebrating the 45th anniversary of the Revista Brasileira de Aplicações de Vácuo (RBAV), a significant milestone for a journal that, since its beginning in 1981, has continuously contributed to the advancement of vacuum science and technology in Brazil. Over more than four decades, RBAV has established itself as the scientific publication vehicle of the Brazilian Vacuum Society (SBV), accompanying the country's evolution in the fields of vacuum applications, materials, thin films, plasmas, deposition techniques, and a wide range of associated experimental methods.

This special edition has a doubly symbolic character. On the one hand, it celebrates RBAV's past, including its tradition, memories, and the dedication of generations of researchers and editors. On the other hand, it marks the beginning of a new editorial phase, launched in September 2025 with the formation of a new Editorial Board committed to expanding the journal's reach, modernizing editorial procedures, and strengthening its role as a reference scientific platform for both academia and industry.

The new phase of RBAV: editorial renewal

Beginning with this edition, RBAV now features a new Editorial Board composed of researchers who represent the thematic diversity of the Brazilian community working in vacuum applications. This renewal is not merely institutional: it symbolizes our commitment to strengthening the journal, modernizing its operations, and enhancing its international visibility. The main guidelines of this new phase include:

- Broadening the editorial scope to incorporate not only traditional scientific articles but also technical papers in partnership with industry, contributions focused on teaching vacuum-related techniques, and texts dedicated to science outreach and human-resource training.
- Maintaining and reinforcing the open-access character that has been a mark of the journal since its beginning.
- Strengthening the peer-review policy, promoting rigorous, timely evaluations aligned with best editorial practices.
- Adopting iThenticate as the official similarity-checking tool, reinforcing our commitment to academic integrity and high standards of originality.
- Expanding integration with the international community by encouraging publication in English and fostering closer interaction with foreign research groups.
- Implementing modern editorial processes, including standardization, digitalization, and continuous improvement of the submission and review interface.

Through these actions, while looking toward the future, we reaffirm principles that have always characterized RBAV: free access, no publication fees, commitment to the national community, and the valorization of knowledge produced in Brazil.

History, collection, and legacy of RBAV

Since 1981, RBAV has played a unique role in the Brazilian scientific landscape. Its full collection, openly accessible at <https://www.sbvacu.org.br/rbav/index.php/rbav/issue/archive> constitutes a historical record of the development of vacuum technologies in Brazil and of the maturation of numerous laboratories, research groups, and industrial applications.

Browsing the journal's archive means revisiting:

- The evolution of physical and chemical deposition methods for thin films;
- The introduction and consolidation of plasma processes;
- The expansion of research on advanced materials;
- The growing engagement of the scientific community with the needs of industrial sectors;
- The training of generations of students, technicians, and researchers who found in RBAV an accessible and welcoming venue for publication.

This collection is not merely a set of articles. It reflects the very trajectory of development of the SBV and its community. Many topics that now seem well established first appeared in the pages of RBAV when they were still experimental or emerging in the country. These records preserve history while also inspiring new directions.

SPECIAL EDITION 45 YEARS - REVIEW ARTICLES THAT SHOWCASE THE EXCELLENCE OF BRAZILIAN RESEARCH IN VACUUM APPLICATIONS

To celebrate this landmark occasion, we invited established research groups, recognized for the impact of their scientific contributions, to prepare review articles that highlight key developments and emerging trends in vacuum applications in Brazil.

This special edition represents not only the celebration of RBAV's 45 years but also a clear testament to the vitality of the Brazilian community dedicated to vacuum applications. By bringing together different perspectives, tribology, materials science, biomedical engineering, CVD technology, and plasma science, we reaffirm the multidisciplinary and cross-cutting nature of the field, demonstrating its relevance and impact across major industrial, scientific, and societal sectors.

The eight articles that make up this edition reflect both the breadth and thematic depth of the journal, namely:

- Tribological behavior of active screen plasma-nitrided offshore materials
- Vacuum processes used for heat and surface treatments of steels and specialty alloys

- Diamond-like carbon (DLC) in ventricular assist devices (VADs): history, techniques, applications, and hemocompatibility
- A global scientific endeavor and its Brazilian chapter: the first cut and polished 2.5-carat CVD diamond grown in Brazil
- Advances in plasma science and technology in Brazil: from origins to present
- The cathodic cage platform in surface engineering: a review
- Economic and scientific relevance of a Brazilian primary vacuum standard
- Diamond-like carbon (DLC) films: improved properties and new applications

International impact and the projection of Brazilian knowledge

One of the goals of this edition is to strengthen RBAV's presence on the global stage. For this reason, all articles were published in English and in open access. Each review presented here has the potential to reach a broad international community, showcasing what Brazil has been producing in strategic topics aligned with major global trends in vacuum technology.

The publication of this special edition in English is not merely an editorial decision; it is a strategic move to highlight Brazilian knowledge, strengthen international collaboration, and expand the circulation of the science produced in the country.

ACKNOWLEDGMENTS AND PERSPECTIVES

The realization of this commemorative edition was only possible thanks to the engagement of the invited authors, the dedication of the reviewers, and the unwavering support of SBV. To all, we extend our sincere appreciation.

May this edition be not only a celebration of RBAV's 45 years but also a starting point for its expansion, modernization, and consolidation as a relevant and internationally recognized scientific journal.

We wish you all an excellent reading experience.

CONFLICT OF INTEREST

Nothing to declare.

AUTHOR CONTRIBUTIONS

Conceptualization: Fraga MA; **Methodology:** Fraga MA; **Research:** Fraga MA; **Writing - First draft:** Fraga MA; **Writing - Proofreading & Editing:** Duarte DA, Silva FC, Rossino LS, and Sagás JC; **Final approval:** Fraga M.

DECLARATION OF USE OF INTELLIGENCE ARTIFICIAL TOOLS

Artificial intelligence was used to review the text for grammar, punctuation, and fluency.

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