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DESCRIPTION

*Vacuum* is an international rapid publications journal with a focus on short communication. All papers are peer-reviewed, with the review process for short communication geared towards very fast turnaround times. The journal also published full research papers, thematic issues and selected papers from leading conferences.

A report in *Vacuum* should represent a major advance in an area that involves a controlled environment at pressures of one atmosphere or below.

The scope of the journal includes:
1. **Vacuum**: original developments in vacuum pumping and instrumentation, vacuum measurement, vacuum gas dynamics, gas-surface interactions, surface treatment for UHV applications and low outgassing, vacuum melting, sintering, and vacuum metrology. Technology and solutions for large-scale facilities (e.g., particle accelerators and fusion devices). New instrumentation (e.g., detectors and electron microscopes).
2. **Plasma science**: advances in PVD, CVD, plasma-assisted CVD, ion sources, deposition processes and analysis.
3. **Surface science**: surface engineering, surface chemistry, surface analysis, crystal growth, ion-surface interactions and etching, nanometer-scale processing, surface modification.

The aim of the short communications is to enable researchers to rapidly share their most exciting work with their colleagues. The expected time from submission to final decision is approximately **6.4 weeks**.

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Surface Scientists, Materials Scientists.

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INTRODUCTION

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1. Vacuum; original developments in vacuum pumping and instrumentation, vacuum measurement, vacuum gas dynamics, gas-surface interactions, surface treatment for UHV applications and low outgassing, vacuum melting, sintering and vacuum metrology. Technology and solutions for large-scale facilities (e.g., particle accelerators and fusion devices). New instrumentation (e.g., detectors and electron microscopes).

2. Plasma science; advances in PVD, CVD, plasma-assisted CVD, ion sources, deposition processes and analysis.

3. Surface science; surface engineering, surface chemistry, surface analysis, crystal growth, ion-surface interactions and etching, nanometer-scale processing, surface modification.


Types of Paper

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2. Full Research Papers: should be full reports including in-depth analysis and extensive discussion. The described research should be complete and thorough, and there are no limitations to text length or number of figures/tables, as long as they add to the understanding of the described research. Criteria for publication are completeness, novelty, and clarity. Manuscripts may be accepted after major revisions. The editors will aim to apply a thorough review process.

3. Besides these two types of manuscripts, Vacuum will publish reviews, thematic issues and a selection of conference papers. These contributions must have the Full Research Paper structure. Such contributions must be prepared in consultation with the special issues editor and can only be submitted after invitation by the guest editor for that issue.

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Sex generally refers to a set of biological attributes that are associated with physical and physiological features (e.g., chromosomal genotype, hormonal levels, internal and external anatomy). A binary sex categorization (male/female) is usually designated at birth (“sex assigned at birth”), most often based solely on the visible external anatomy of a newborn. Gender generally refers to socially constructed roles, behaviors, and identities of women, men and gender-diverse people that occur in a historical and cultural context and may vary across societies and over time. Gender influences how people view themselves and each other, how they behave and interact and how power is distributed in society. Sex and gender are often incorrectly portrayed as binary (female/male or woman/man) and unchanging whereas these constructs actually exist along a spectrum and include additional sex categorizations and gender identities such as people who are intersex/have differences of sex development (DSD) or identify as non-binary. Moreover, the terms "sex" and "gender" can be ambiguous—thus it is important for authors to define the manner in which they are used. In addition to this definition guidance and the SAGER guidelines, the resources on this page offer further insight around sex and gender in research studies.

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If your article includes any Videos and/or other Supplementary material, this should be included in your initial submission for peer review purposes.

Divide the article into clearly defined sections.

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Please ensure the figures and the tables included in the single file are placed next to the relevant text in the manuscript, rather than at the bottom or the top of the file. The corresponding caption should be placed directly below the figure or table.

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This journal accepts two different types of unsolicited manuscripts with different subdivision of text: Short Communications (Letters) and Full Research Papers.

1. **Short Communications**
   Short Communications should be kept concise and short, the number of figures and tables should also be kept to a minimum. The main text of the manuscripts should not exceed 2,500 words, and the number of combined tables/images/figures should not exceed 5. Abstract should contain less than 150 words. The main text should not contain any headings. The main text should end with a concluding statement and optional acknowledgement.

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The described research should be complete and thorough, and there are no limitations to text or number of figures/tables, as long as they add to the understanding of the described research. The main text of your article should be divided into clearly defined and numbered sections with appropriate headings (Introduction, Materials and Methods, Theory/Calculation, Results, Discussion, Conclusions). Subsections should be numbered 1.1 (then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to 'the text'. Any subsection may be given a brief heading. Each heading should appear on its own separate line.

**Introduction**
State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

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**Theory/calculation**
A Theory section should extend, not repeat, the background to the article already dealt with in the Introduction and lay the foundation for further work. In contrast, a Calculation section represents a practical development from a theoretical basis.

**Results**
Results should be clear and concise.

**Discussion**
This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

**Conclusions**
The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.
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A self-contained abstract of up to 150 words for Short Communications (Letters) and 200 words for Full Research Papers, outlining in a single paragraph the purpose of the research, the principal results and major conclusions. An abstract is often presented separate from the article, so it must be able to stand alone. For this reason, references should be avoided, but if essential, they must be cited in full, without reference to the reference list. Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

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Please submit math equations as editable text and not as images. Present simple formulae in line with normal text where possible and use the solidus (/) instead of a horizontal line for small fractional terms, e.g., X/Y. In principle, variables are to be presented in italics. Powers of e are often more conveniently denoted by exp. Number consecutively any equations that have to be displayed separately from the text (if referred to explicitly in the text).

Units to be used in 'Vacuum'

Pressure: Authors are asked to use bar (bar), millibar (mbar) or the pascal (Pa). The SI unit of pressure is the pascal (Pa), the special name for the newton per square metre (N m⁻²). The standard atmosphere (atm) is defined in ISO 31/111-1978 (E) as exactly 101.325 kPa. The standard atmosphere should only be used to define a reference environment and not as a pressure unit. The 'bar' has become widely used as a unit of pressure in vacuum measurement.

1 bar = 10⁵ Pa exactly
1 millibar (mbar) = 100 Pa exactly.

Other units of pressure are sometimes to be found in published literature but their use is deprecated in ISO 31/111-1978(E) and in some countries their use is unlawful for certain purposes. A table of conversion factors for such units is given below to allow authors to change their units to pascals or millibars.

The pascal can be combined with other SI units to give the units for other quantities commonly measured in vacuum science and technology. Some examples of these quantities are given below.

Pump speed: Authors are asked to use cubic metre per second (m³ s⁻¹), cubic metre per hour (m³ h⁻¹), or litre per second (l s⁻¹).

The SI unit for volumetric rate of flow such as is used when expressing the speed of a vacuum pump is cubic metre per second (m³ s⁻¹). The speed of most mechanical pumps is expressed in terms of cubic metre per hour (m³ h⁻¹).

1 m³ h⁻¹ = 1/3600 m³ s⁻¹ 0.000278 m³ s⁻¹).

The speed of most high vacuum pumps such as diffusion and turbomolecular pumps is expressed in terms of liter per second (l s⁻¹).

1 l s⁻¹ = 10⁻³ m³ s⁻¹.

Leak rate: Authors are asked to use pascal metre cube per second (Pa m³ s⁻¹) or millibar litre per second (mbar l s⁻¹).

The SI unit for leak rate is pascal metre cube per second (Pa m³ s⁻¹). Other commonly used units of leak rate with their conversion to the SI unit are given in the table.

Outgassing rate: Authors are asked to use pascal metre cube per second per square metre (Pa m³ s⁻¹ m⁻²) or millibar litre per second per square centimetre (mbar l s⁻¹ cm⁻²).
The SI unit for outgassing rate from surfaces is pascal metre cube per second per square metre (Pa m³ s⁻¹ m⁻²). Other commonly used units of outgassing rate with their conversion to the SI unit are given in the table.

<table>
<thead>
<tr>
<th>Quantity measured in</th>
<th>Multiply by</th>
<th>Resulting number in</th>
<th>Multiply column (3) by</th>
<th>Resulting number in</th>
</tr>
</thead>
<tbody>
<tr>
<td>torr</td>
<td>133.322 Pa</td>
<td>0.01 mbar mm Hg</td>
<td>133.322 Pa 0.01 mbar</td>
<td>microns</td>
</tr>
<tr>
<td>g cm⁻²</td>
<td>98.0665 kPa</td>
<td>10 mbar m⁻³ h⁻¹</td>
<td>0.000278 m³ s⁻¹ l⁻¹</td>
<td>0.001 m³ s⁻¹</td>
</tr>
<tr>
<td>technical atmospheres</td>
<td>0.133322 Pa</td>
<td>m⁻³ s⁻¹ 10 mbar l s⁻¹</td>
<td>0.101325 Pa m⁻³ s⁻¹</td>
<td>10 mbar l s⁻¹ cm⁻²</td>
</tr>
<tr>
<td>standard atmosphere</td>
<td>0.133322 Pa</td>
<td>m⁻³ s⁻¹ 10 mbar l s⁻¹</td>
<td>1333.22 Pa m⁻³ s⁻¹ m⁻²</td>
<td>0.001 mbar l s⁻¹ cm⁻²</td>
</tr>
</tbody>
</table>

Table of conversion factors

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