



Frontiers in Materials Has the Ambition of Taking Up the “Grand Challenge” of Following Leonardo da Vinci’s Legacy

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The Italian Renaissance genius, artist, inventor and scientist Leonardo da Vinci (1452–1519), **Figure 1A**, produced pioneering contributions in several disciplines including materials science. For example Leonardo, recognizing the importance of tensile tests for the characterization of the strength of materials, proposed a machine for their realization (Cod. Atl. sheet 82 recto b, **Figure 1B**), including for repeated impact tests (Cod. Atl. sheet 21 recto a, **Figure 1C**) and was a precursor in deriving structural and material fundamental laws such as the constitutive Hooke’s law (see Cod. Atl. sheet 110 verso b) (Pugno, 1948). Today, 500 years after his death, materials science is still attracting widespread attention worldwide, both in academia and industry.

Indeed, the field of materials science is broad and multi-faceted, involving the study of the properties of matter, applications in various fields, physical and chemical insights, as well as broad engineering developments. Materials are so intertwined with our lives that the different stages of human history have been described using definitions linked to them. In the Stone Age, naturally occurring materials were used by our ancestors, such as stone, wood, and clay. It is only in the Bronze Age that we saw the beginnings of metallurgy, starting humanity’s course in material processing. The Iron Age further stimulated the race to harder and stronger materials. Currently, materials science has become an important field of study in science and engineering. Ranging from biomaterials, to structural materials and energy materials, it covers all aspects of our lives. Understanding how materials behave is thus key to the development and design of new materials.

Frontiers in Materials was launched in 2014, with the goal to create an interdisciplinary open-access journal to promote and disseminate high-quality research in the field of materials science. As the Field Chief Editor, I am supported by an outstanding Editorial Office, including the journal development team, and an excellent Editorial Board of international researchers. This facilitates thorough discussion between various research communities, and publication

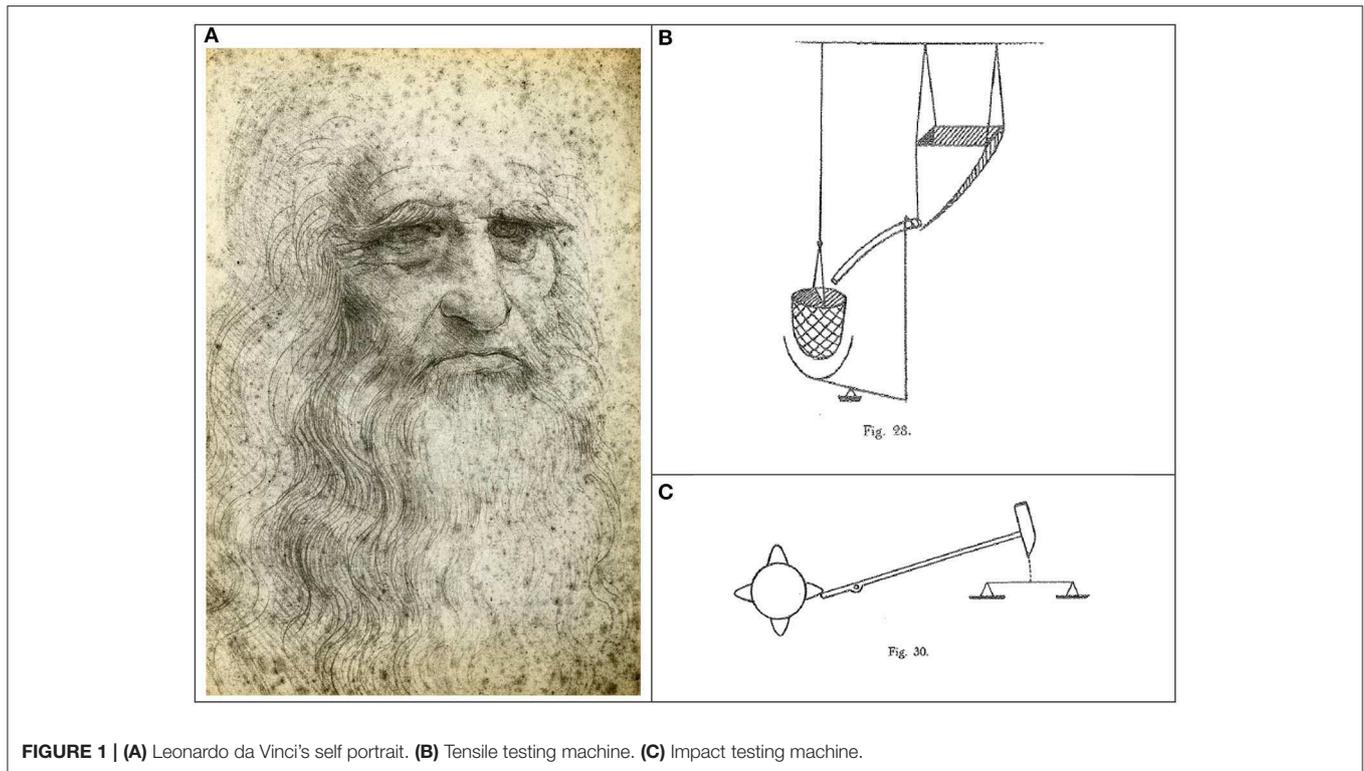


FIGURE 1 | (A) Leonardo da Vinci's self portrait. **(B)** Tensile testing machine. **(C)** Impact testing machine.

as well as dissemination of impactful discoveries to academics, industry professionals and the public, worldwide. After 3 years of existence, the journal received its first Impact Factor in 2017 (2.008), rendering the journal more visible to the community. This visibility helped the journal increase in size—almost doubled—and in quality, gaining more impetus than the previous year. This translated into a second Impact Factor in 2018 increased by 30% (2.689). The surge in publications in 2019, reaching more than 250 published papers, displays the interest of the materials science community in a broad, open-access, interdisciplinary materials-science journal, which showcases latest developments in the field to the whole world. As an example, the success of our “*Frontiers in Materials: Rising Stars*” Research Topic further supports the idea that an Open Access general Materials journal is necessary and welcomed by the younger generation of researchers, as the paragon of tomorrow’s publishing model.

This growth was further driven this year with the launch of our most recent Quantum Materials section, thus bringing the complete number of specialty sections along the journal to 15, alongside Biomaterials (shared with our sister journal *Frontiers in Bioengineering and Biotechnology*), Carbon-Based Materials, Colloidal Materials and Interfaces, Computational Materials Science, Energy Materials, Environmental Materials, Functional Ceramics, Glass Science, Mechanics of Materials, Polymeric and Composite Materials, Smart Materials, Structural Materials, Thin Solid Films, and Translational Materials Science.

Frontiers in Materials has a goal to grow with a focus on the excellence of science, while ensuring that the community

recognizes itself in the journal. Strong emphasis will be brought to the interdisciplinary aspects of the journal: communities and societies will be invited to play a key role in its strategic development. Indeed, as a community-driven publisher, *Frontiers in Materials* will be continuing to empower researchers in shaping the future of their fields of research. This means that particular effort is being made in supporting subjects and areas that are important to our authorship, and sharing their latest advances. This, in particular, means that the journal will pursue its way to diversity, by ensuring that geographical and gender balances are attained through its board. Our recent Research Topic “Women in Science: Materials” has led the way to reinforcing this diversity policy, and we shall proudly support and promote women scientists, too.

Concluding, *Frontiers in Materials* has the ambition of taking up the “Grand Challenge” of following Leonardo’s legacy: to publish, 500 years after his death, open access cutting edge research. This must cover the entire spectrum of materials disciplines, including emerging new fields such as, for example, Metamaterials (Bosia et al., 2018) or Bionicomposites (Pugno and Valentini, 2019) i.e., the natural evolution of bio-inspired materials, remembering that Leonardo can also be considered the father of bio-inspired design.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

REFERENCES

- Bosia, F., Krushynska, A. O., Miniaci, M., Morvan, B., and Pugno, N. M. (2018). Editorial: advances in mechanical metamaterials. *Front. Mater.* 5:56. doi: 10.3389/fmats.2018.00056
- Pugno, G. M. (1948). "I codici vinciani e la scienza delle costruzioni," in *Atti del convegno nazionale per l'istruzione dei geometri e dei periti edili* (Torino), 1–39.
- Pugno, N. M., and Valentini, L. (2019). Bionic composites. *Nanoscale* 11, 3102–3111. doi: 10.1039/c8nr08569b

Conflict of Interest: The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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