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*Editorial*

# *Powder Metallurgy*: A New Open Section in *Metals*

**Jose Manuel Torralba** [1,2]

[1] Materials Science and Engineering Department, Universidad Carlos III de Madrid, 28911 Leganés, Spain; torralba@ing.uc3m.es
[2] IMDEA Materials Institute, 28906 Getafe, Spain

Powder Metallurgy (PM) is a forming technology that uses metallic (sometimes also in conjunction with ceramic) powders to develop parts, most of the time through a thermal process called sintering, which never reaches the melting point of the principal component of the alloy. Today, we can consider the additive manufacturing (AM) methods that use metallic powders as part of the PM technologies, even though the consolidation sometimes takes place through the melting of the metallic powders. The fact that the knowledge of the metallic powder's properties and its handling is one of the key stages in the AM processes allows us to also include these technologies within the scope of PM.

PM is a field of Materials Technology that has developed as the result of three main reasons: (1) this technology can be used to mass produce cost-effective machine parts (this is the case for many parts used in the automotive industry, where saving raw materials and energy made PM a green technology); (2) in many applications, PM is a captive technology, being a unique way to produce some specific materials (this is the case for cemented carbides and self-lubricating bearings); and (3) PM offers a production method whereby we can obtain the materials with the best possible performance (this is due to the possibility of controlling the composition and microstructure in a more reliable way than is possible via many other alternative processing methods). Recently, the emerging interest in the additive manufacturing of metals has also made PM a leading area of research interest because the knowledge and control of the powder is a key issue in the quality standards of the 3D printed metallic parts.

However, even though PM has already been a mature technology for many decades, there are many open challenges to be overcome. In the mass production technologies, new materials that could replace the critical ones (according to the EU regulations) and new procedures that could help to reduce the cost without losing performance are some of the challenges. In the case of using PM as a captive technology, and also in any kind of development of the so-called "high-performance materials", the new processing methods, based on high activated sintering processes, allow us to control the microstructure much more accurately and, as a consequence, improve its properties.

However, while the technological challenges in PM are highly attractive, the scientific challenges it poses are also important. Additionally, virtual processing and virtual testing approaches are also crucial for improving PM. New powder development technologies, new and improved consolidation methods (including additive manufacturing and field-assisted technologies), highly accurate modelling approaches, and new characterization techniques (including in situ capabilities that allow us to gain a better understanding of the fundamentals in any family of alloys) make PM a thrilling field of study.

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## Short Biography of Authors

**José Manuel Torralba** is a Professor of Materials Science and Engineering in the Department of Materials Science and Engineering at the Universidad Carlos III de Madrid (UC3M) and a Senior Scientist at the IMDEA Materials Institute. Prof. Torralba is a Fellow of the two most important Powder Metallurgy associations in the world: FAPMI and FEPMA (he is the first European to be a Fellow at the same time in Europe and the USA). He has participated in more than 80 International Advisory Committees at International Conferences, in about 35 competitive funded projects (among which five EU projects and one NSF–USA project), and in several research evaluation panels (including the EU Research Framework Programmes) in countries including Israel and New Zealand. Throughout his career, Prof. Torralba has constantly striven for a holistic approach, being involved in a wide number of academic activities: teaching, research, innovation, university management, and the management of research programmes and science communication. He also regularly participates in activities related to mentoring, research integrity, new ethics in science, and the promotion of healthy conditions in research labs. He has been an active supervisor of Ph.D. students and has created a good international network of former students in both academia and industry.