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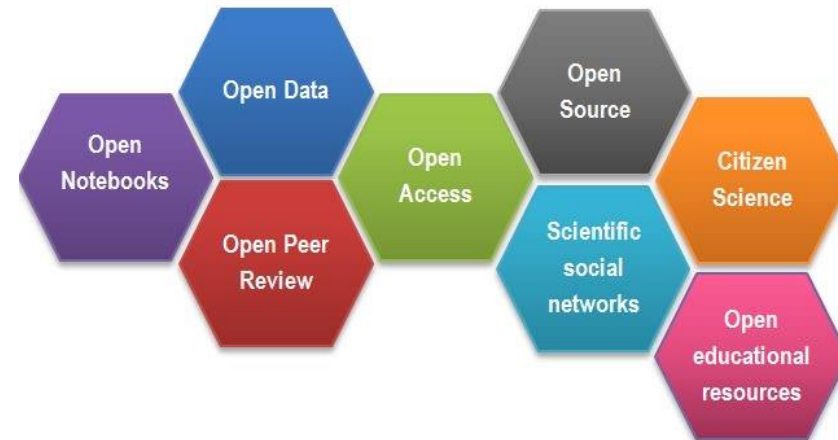
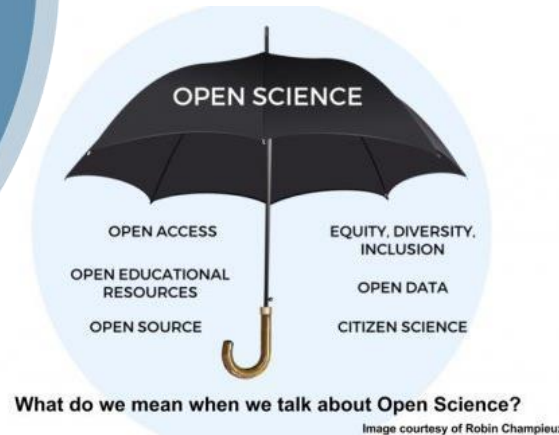
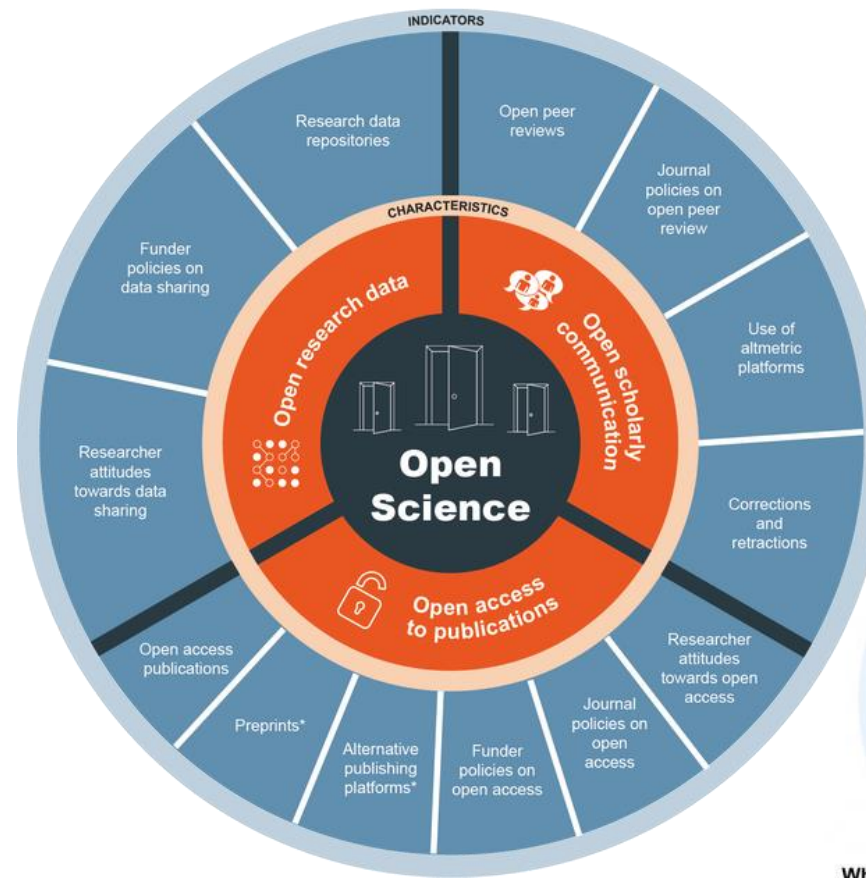
Marta Jordan  
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# We will talk about...

- Open Science
  - What is it?
  - Benefits
- Open Access:
  - Legal framework
  - Creative Commons Licenses
  - Open access routes
- Publishing:
  - Before publication
  - Where?
  - Publishers' policies
  - Versions of the document
- Open Access at the UAB
- Open research data
- Good practices and suggestions

# Open Science

- New approach to scientific research based on cooperative workflows and new ways of dissemination through digital technologies and collaborative tools
- Stronger interaction between researchers and society
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# Open access: what is it?

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Budapest Manifesto, February 2002

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- UAB open Access institutional policy (2012)
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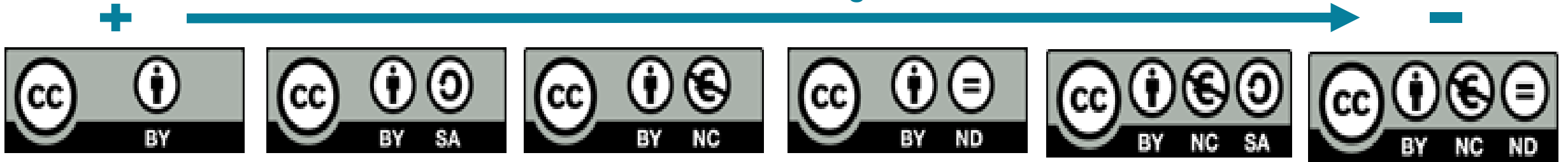
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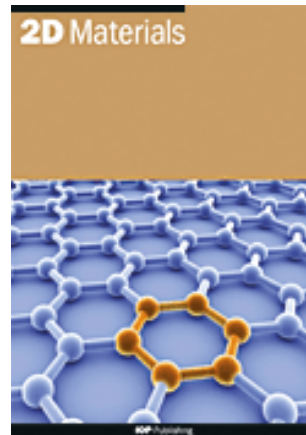


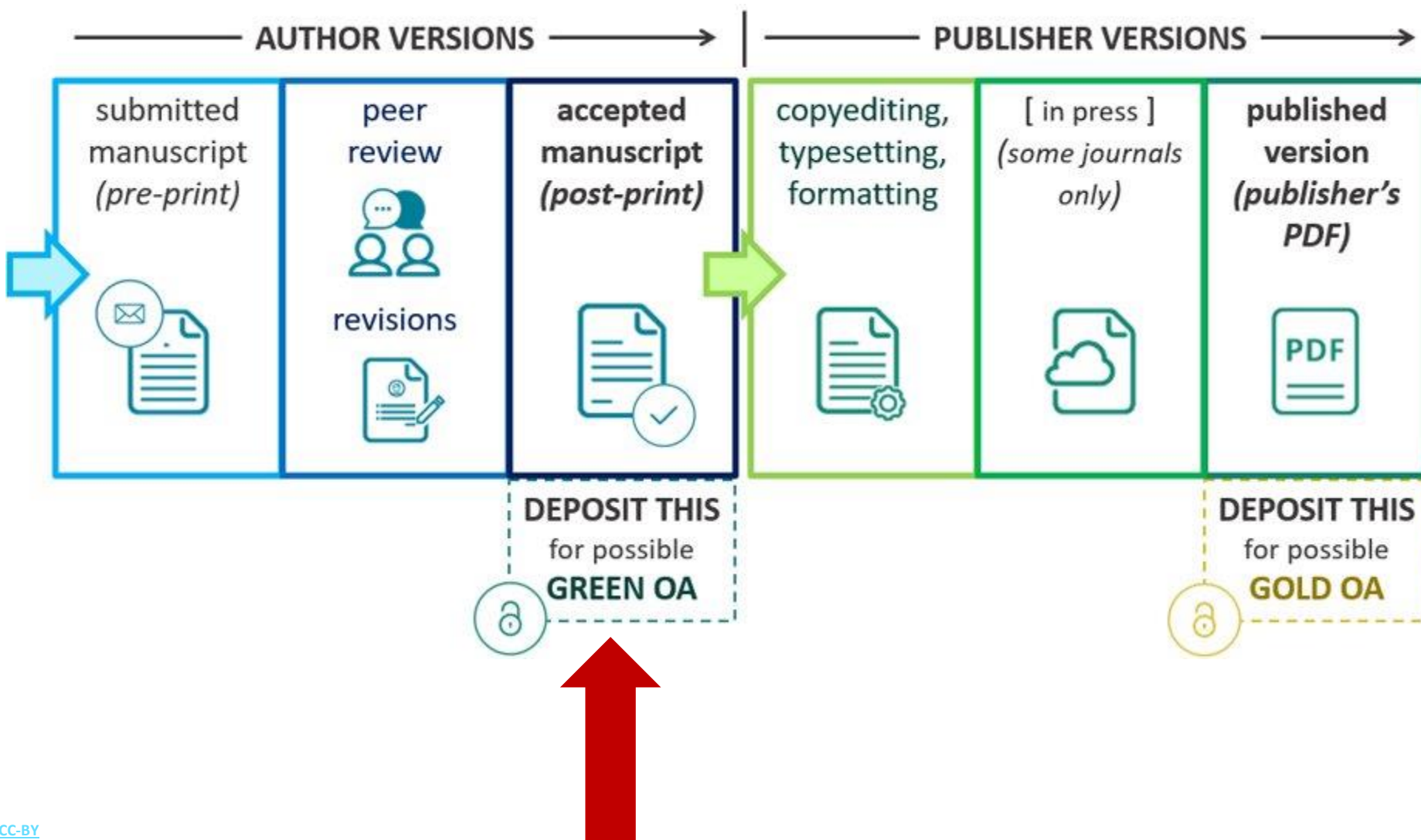
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Improved plasticity and corrosion behavior in Ti-Zr-Cu-Pd metallic glass with minor additions of Nb: An alloy composition intended for biomedical applications

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ARTICLE INFO

ABSTRACT

The effects of minor additions of Nb (2.3 and 4 at%) to the Ti<sub>20</sub>Zr<sub>40</sub>Cu<sub>30</sub>Pd<sub>10</sub> alloy are discussed in terms of microstructure, thermal behavior, mechanical properties and corrosion resistance. The addition of Nb promotes the formation of nanocrystals, i.e. from a completely amorphous structure (when no Nb is added) to a mainly crystalline structure (for a at% of Nb added). The glassy alloy exhibits large hardness, relatively low Young's modulus and mechanical loss behavior, although the glassiness is rather limited. A significant increase in compressive ductility (total strain over 13%) is achieved in the sample with 3 at% of Nb without compromising the strength. Young's modulus of the as-cast alloy (around 100 GPa, as determined from ultrasonic measurements) increases only slightly when dispersed nanocrystallites are embedded in the amorphous matrix. Improvement of the corrosion performance, with delayed pitting corrosion, is also observed for 3 at% Nb addition.

Keywords: Biocompatibility; Corrosion; Ti-based bulk glassy alloy; Elastic properties; Plasticity

1. Introduction

Bulk metallic glasses (BMGs) have been widely investigated during the last decades owing to their exceptional mechanical properties, such as high strength, large elasticity and good corrosion resistance. In recent years, the study of BMGs has focused on improving the low plasticity typically encountered in these alloys, to make them suitable materials for structural and engineering applications [1]. Specifically, BMG free from toxic or non-biocompatible elements (e.g., Be, Al, Ni, Co or Cr) have attracted huge interest to be used in the biomedical field since they possess higher strength, lower Young's modulus and often better corrosion and wear resistance than their crystalline counterparts [2]. Among the various compositions of metallic glasses, Ti-based and Zr-based BMG are the most commonly investigated alloys. In particular, Zr-based BMG become attractive to be used in the biomedical field due to their high glass forming ability and large plasticity. However, Zr-based BMG with high glass forming ability and enhanced mechanical properties usually contain toxic elements such as Nb, Be or Al, hence restricting their use in many biomedical applications. Nevertheless, recent studies on Zr-based BMG containing Al and/or Nb claimed to be non-toxic materials and to exhibit a biocompatibility comparable to that of commercial Ti-6Al-4V alloy [3,4].

Ti-based BMG attract attention as a result of its low density and excellent corrosion and biocompatibility properties. Unfortunately, the plasticity under compression reported for Be-containing Ti-based BMGs [5], cannot be observed in Ti-based BMGs free from toxic elements which hampers their applications as structural components.

Up to now, Ti-6Al-4V alloy remains the most widely used structural metallic biomaterial for the replacement of hard tissues in artificial joints. However, the Ti-29Cu-19Pd BMG exhibits higher strength (almost twice) and lower Young's modulus than commercial Ti-6Al-4V [6]. Unfortunately, like most metallic glasses, the Ti-29Cu-19Pd alloy exhibits low plasticity. This is due to the absence of dislocation activity and the rapid propagation of shear slip bands throughout the sample under application of mechanical stress. Several strategies have been pursued to improve the plasticity of this type of alloys. For example, annealing treatment at intermediate temperatures, i.e. between the glass transition temperature ( $T_g$ ) and the crystallization temperature ( $T_c$ ), can result in a certain increase of plastic strain [7]. However, different (and sometimes contrasting) effects are often observed after annealing depending on the exact alloy composition and the heat treatment conditions. For example, apart from causing nucleation

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Hybrid Helical Magnetic Microrobots Obtained by 3D Template-Assisted Electrodeposition

Muhammad A. Zeeshan<sup>a,\*</sup>, Roman Grisch<sup>a</sup>, Eva Pellicer<sup>a</sup>, Kartik M. Sivaraman<sup>a</sup>, Kathrin E. Peyer<sup>a</sup>, Jordi Sort<sup>a</sup>, Berna Özkale<sup>a</sup>, Mahmut S. Sakar<sup>a</sup>, Bradley J. Nelson<sup>a</sup>, and Salvador Pané<sup>a</sup>

The development of micro- and nanoelectromechanical systems (MEMS/NEMS) technology has resulted in the fabrication of micro- and nanomachines that can be controlled wirelessly in liquid environments. Among the various actuation and control strategies for these machines, magnetic manipulation has emerged as the most versatile approach, and control of micro- and nanomachines using rotating magnetic fields and rotating magnetic fields has been demonstrated [1,2]. Rotation is a fundamental motion in biological systems at the micro and nano levels. Rotating magnetic fields are responsible for the motion of the bacterial flagella and the ATP synthase molecule. These motors convert rotational motion into translational motion, a strategy that has proven to be effective in the low Reynolds number regime [3]. Based on this principle, helical microstructures known as artificial bacterial flagella (ABFs) have been wirelessly manipulated in liquid environments using rotating magnetic fields [4,5]. Potential in vitro applications of these machines have made use of their ability to perform non-contact capture and transport of micro-objects. For in vivo applications such as targeted drug delivery applications, it is foreseen that a group of these micro-machines could have access to many hard-to-reach locations in the body and maximize drug loading and release. They could navigate through the circulatory, urinary and central nervous systems. The microbots could also be applied in water remediation to patrol stagnant and flowing waterways for effective degradation of organic pollutants. For this application, the microbots should be functionalized with a photocatalytic compound. In any case a swarm control strategy will necessitate the development of reliable processes to fabricate these machines from a combination of materials that enable magnetic control and the incorporation of therapeutic molecules.

In combination with photolithography, electrodeposition has been used to fabricate relatively complex wirelessly controllable 3-D micromachines [6]. Electrodeposition enables the synthesis of a wide variety of magnetic alloys, and allows the tuning of their properties by modulating factors such as the pH and temperature of the electrolytic bath, additives, and the current density or overpotential of deposition. Electrodeposition also enables the polymerization of a unique class of intrinsically conductive polymers (ICP) on metallic substrates. Among ICP, poly(pyrrrole) (PPy) is the most widely studied and characterized due to its excellent biocompatibility, enhanced physical and chemical stability, the tunability of its surface towards various cell types, and the ability to incorporate therapeutic molecules into its matrix [7,8].

In this paper, we describe a high throughput method to fabricate hybrid artificial bacterial flagella (h-ABFs) consisting of a ferromagnetic microrod and a helical polymer tail (see Figure 1(a)). h-ABFs present a number of advantages compared to fully metallic systems including a lighter weight that reduces sedimentation and facilitates navigation and better biocompatibility because of the replacement of metallic parts with PPy. The h-ABFs were synthesized by template-assisted two-step electrodeposition. The direct laser writing (DLW) process provided a simple method to make 3-D photostereotyped templates acting as masks during the electrodeposition. With the use of a positive-tone photoresist, it is possible to make 3-D cavities that can be filled by electrodeposition. h-ABFs were physically stable in an aqueous environment with a rigid connection between the metallic and polymer segments. The wireless manipulation of these h-ABFs using rotating magnetic fields was demonstrated with a focus on swarm control.

An h-ABF is illustrated in Figure 1(a) and is designed to have a ferromagnetic head for magnetic actuation and a helical tail that provides propulsion in liquid environments. Fig-

M. A. Zeeshan, R. Grisch, K. M. Sivaraman, K. E. Peyer, B. Özkale, Dr. M. S. Sakar, Prof. Dr. B. J. Nelson and Dr. S. Pané, Institute of Robotics & Intelligent Systems (IRIS), ETH Zürich Zürich, Switzerland (E-mail: [maritree@ethz.ch](mailto:maritree@ethz.ch), [vidalp@ethz.ch](mailto:vidalp@ethz.ch), [vidalp@ethz.ch](mailto:vidalp@ethz.ch)).

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Prof. Dr. J. Sort, Institut Català de Recerca i Estudis Avançats (ICREA), and Departament de Física, Universitat Autònoma de Barcelona Bellaterra, Spain  
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**Focal release of neurotrophic factors by biodegradable microspheres enhance motor and sensory axonal regeneration in vitro and in vivo**

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This is the accepted version of Huang, M., et al. "Velocity of change in vegetation productivity over northern high latitudes" in Nature ecology and evolution, vol. 1 (Nov. 2017), p. 2397-334X. DOI 10.1038/s41559-017-0328-y. This version is available at <https://ddd.uab.cat/record/181846> under the terms of the All rights reserved license.

**Velocity of change in vegetation productivity over northern high latitudes**

- 1
- 2
- 3 Mengtian Huang<sup>1</sup>, Shilong Piao<sup>1,2</sup>, Ivan A. Janssens<sup>3</sup>, Zaichun Zhu<sup>1</sup>, Tao Wang<sup>2</sup>, Donghai Wu<sup>1</sup>,
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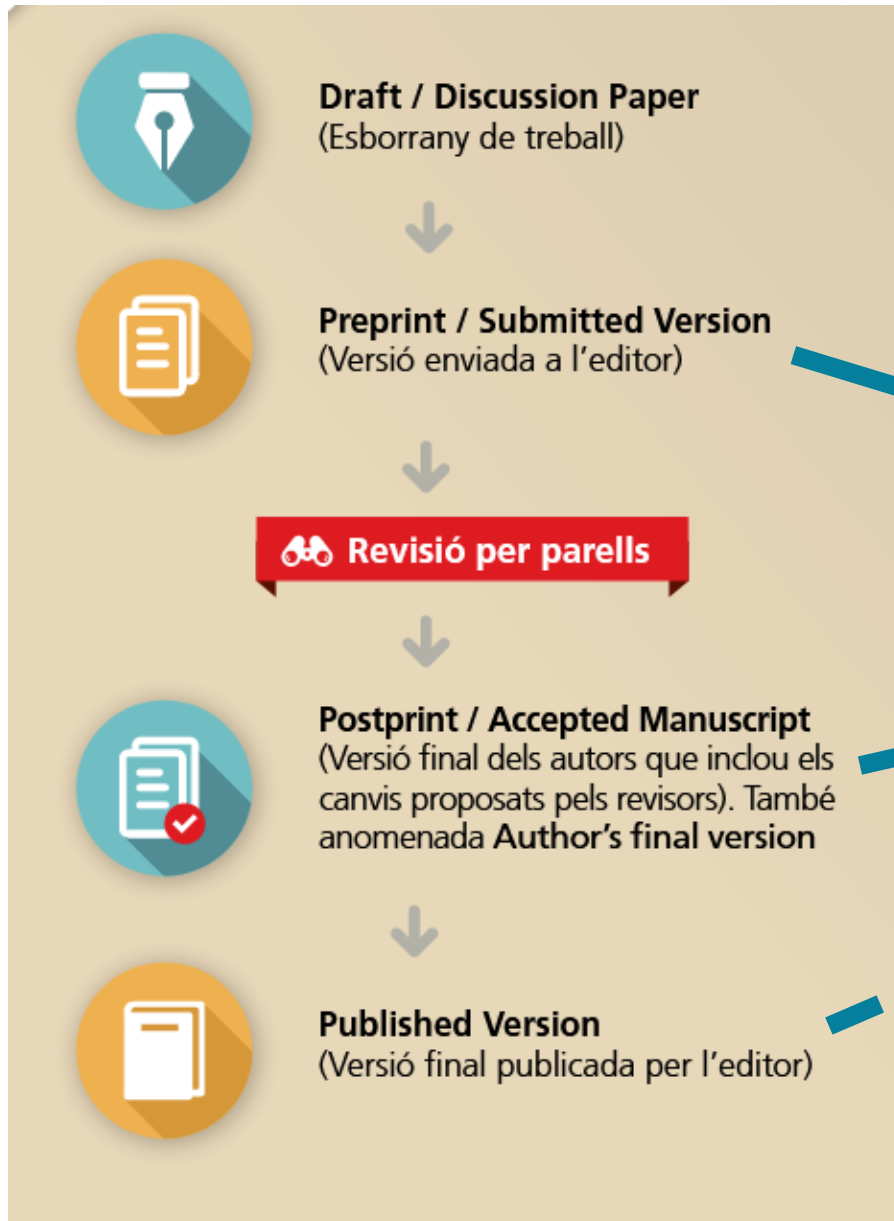


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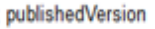
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**Novel Ti-Zr-Hf-Fe Nanostructured Alloy for Biomedical Applications**

Hynowska, Anna (Universitat Autònoma de Barcelona. Departament de Física)


Blanquer, Andreu  (Universitat Autònoma de Barcelona. Departament de Biologia Cel·lular, Fisiologia i Immunologia)Pellicer Vilà, Eva M. (Eva Maria)  (Universitat Autònoma de Barcelona. Departament de Física)Fornell Beringues, Jordina  (Universitat Autònoma de Barcelona. Departament de Física)Suriñach, Santiago (Suriñach Cornet)  (Universitat Autònoma de Barcelona. Departament de Física)Baró, M. D.  (Universitat Autònoma de Barcelona. Departament de Física)


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Ibáñez, Elena  (Universitat Autònoma de Barcelona. Departament de Biologia Cel·lular, de Fisiologia i d'Immunologia)Barrios, L. (Leonardo)  (Universitat Autònoma de Barcelona. Departament de Biologia Cel·lular, de Fisiologia i d'Immunologia)Nogués, C. (Carme)  (Universitat Autònoma de Barcelona. Departament de Biologia Cel·lular, de Fisiologia i d'Immunologia)Sort Viñas, Jordi  (Universitat Autònoma de Barcelona. Departament de Física) *Amaga***Data:** 2013**Resum:** The synthesis and characterization of Ti40Zr20Hf20Fe20 (atom %) alloy, in the form of rods ( $\varnothing = 2$  mm), prepared by arc-melting, and subsequent Cu mold suction casting, is presented. The microstructure, mechanical and corrosion properties, as well as in vitro biocompatibility of this alloy, are investigated. This material consists of a mixture of several nanocrystalline phases. It exhibits excellent mechanical behavior, dominated by high strength and relatively low Young's modulus, and also good corrosion resistance, as evidenced by the passive behavior in a wide potential window and the low corrosion current densities values. In terms of biocompatibility, this alloy is not cytotoxic and preosteoblast cells can easily adhere onto its surface and differentiate into osteoblasts.**Nota:** Número d'acord de subvenció EC/FP7/264635**Nota:** Número d'acord de subvenció MICINN/MAT2011-27380-C02-01**Nota:** Número d'acord de subvenció MICINN/TEC2011-29140-C03-03**Nota:** Número d'acord de subvenció AGAUR/2009-SGR-282**Nota:** Número d'acord de subvenció AGAUR/2009-SGR-1292**Drets:** Aquest document està subjecte a una llicència d'ús Creative Commons. Es permet la reproducció total o parcial, la distribució, la comunicació pública de l'obra i la creació d'obres derivades, fins i tot amb finalitats comercials, sempre i quan es reconegui l'autoria de l'obra original. **Llengua:** Anglès**Document:** article ; recerca **Matèria:** Ti-based alloy ; Biomaterials ; microstructure ; Mechanical behavior ; Corrosion performance**Publicat a:** *Materials*, Vol. 6 (2013) , p. 4930-4945, ISSN 1996-1944**DOI:** 10.3390/ma6114930**PMID:** 28788368

### Label-free and reagentless electrochemical genosensor based on graphene acid for meat adulteration detection

Flauzino, J. M. R. (Institut Català de Nanociència i Nanotecnologia)

Nguyen, Emily P.  (Institut Català de Nanociència i Nanotecnologia)

Yang, Qiuyue  (Institut Català de Nanociència i Nanotecnologia)

Rosati, Giulio  (Institut Català de Nanociència i Nanotecnologia)

Panáček, David (Institut Català de Nanociència i Nanotecnologia)


Brito-Madurro, Ana G. (Federal University of Uberlândia. Institute of Biotechnology (Brazil)) [...] [Show all 10 authors](#)

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**Abstract:** With the increased demand for beef in emerging markets, the development of quality-control diagnostics that are fast, cheap and easy to handle is essential. Especially where beef must be free from pork residues, due to religious, cultural or allergic reasons, the availability of such diagnostic tools is crucial. In this work, we report a label-free impedimetric genosensor for the sensitive detection of pork residues in meat, by leveraging the biosensing capabilities of graphene acid - a densely and selectively functionalized graphene derivative. A single stranded DNA probe, specific for the pork mitochondrial genome, was immobilized onto carbon screen-printed electrodes modified with graphene acid. It was demonstrated that graphene acid improved the charge transport properties of the electrode, following a simple and rapid electrode modification and detection protocol. Using non-faradaic electrochemical impedance spectroscopy, which does not require any electrochemical indicators or redox pairs, the detection of pork residues in beef was achieved in less than 45 min (including sample preparation), with a limit of detection of 9% w/w pork content in beef samples. Importantly, the sample did not need to be purified or amplified, and the biosensor retained its performance properties unchanged for at least 4 weeks. This set of features places the present pork DNA sensor among the most attractive for further development and commercialization. Furthermore, it paves the way for the development of sensitive and selective point-of-need sensing devices for label-free, fast, simple and reliable monitoring of meat purity.

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European Commission 683024

**Note:** Altres ajuts: CERCA Programme/Generalitat de Catalunya

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**Language:** Anglès

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**Subject:** Food adulteration ; DNA biosensor ; Non-faradaic electrochemical impedance spectroscopy ; Beef ; Pork

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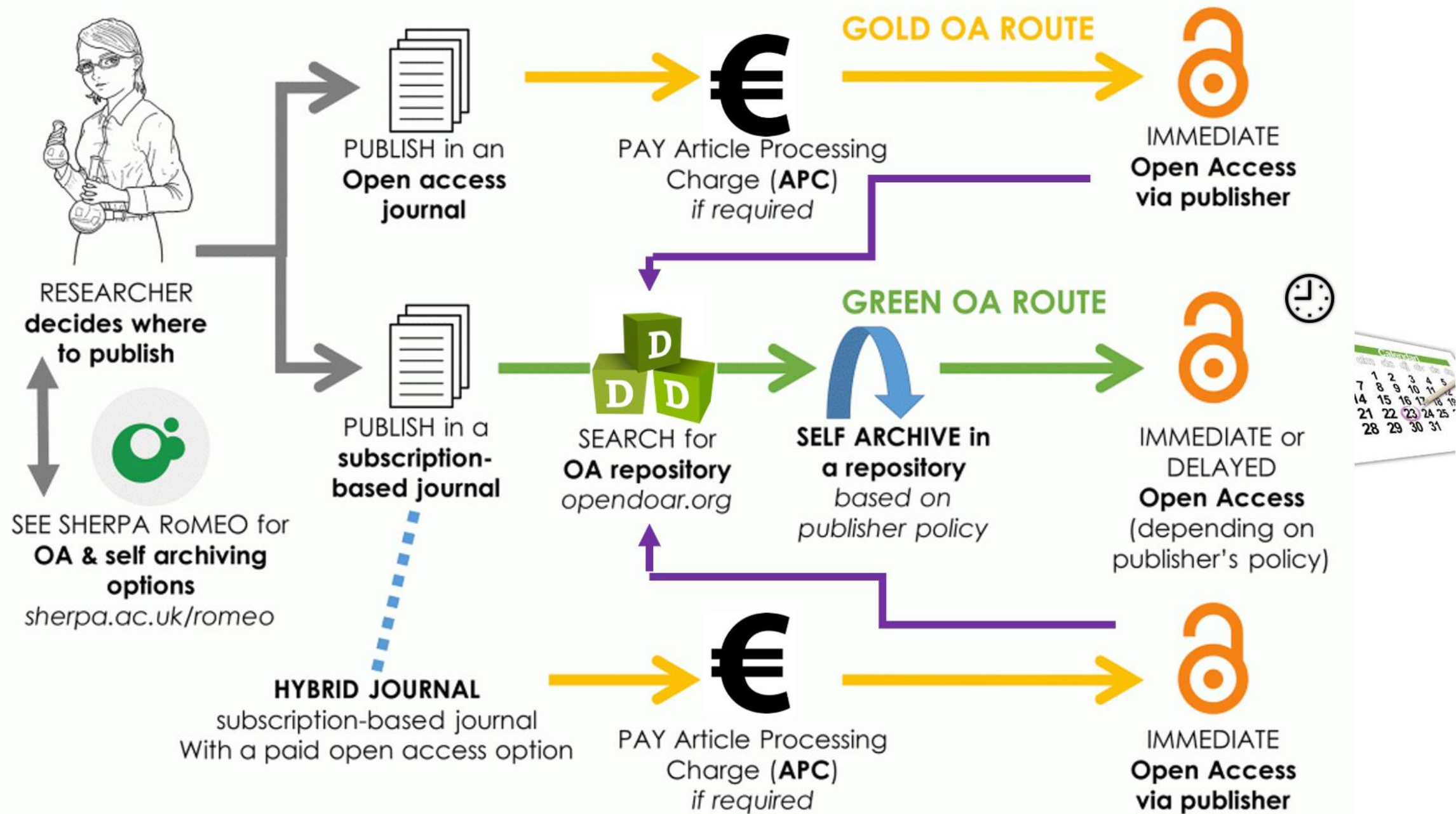
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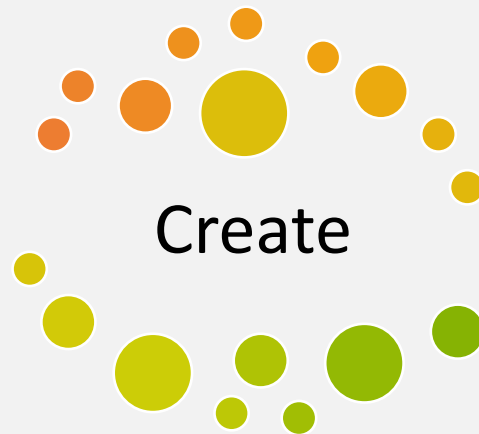




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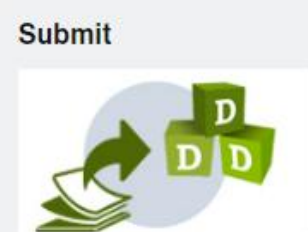
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