

NRC Publications Archive Archives des publications du CNRC

Titanium Foams based on a Powder Metallurgy Approach

Baril, Éric; Lefebvre, Louis-Philippe

This publication could be one of several versions: author's original, accepted manuscript or the publisher's version. /
La version de cette publication peut être l'une des suivantes : la version prépublication de l'auteur, la version acceptée du manuscrit ou la version de l'éditeur.

Publisher's version / Version de l'éditeur:

Titanium 2008, 24th Annual Conference [Proceedings], p. 1, 2008

NRC Publications Archive Record / Notice des Archives des publications du CNRC :

<https://nrc-publications.canada.ca/eng/view/object/?id=14f79d9e-7405-4bfe-83c3-d39839c9f5f7>

<https://publications-cnrc.canada.ca/fra/voir/objet/?id=14f79d9e-7405-4bfe-83c3-d39839c9f5f7>

Access and use of this website and the material on it are subject to the Terms and Conditions set forth at

<https://nrc-publications.canada.ca/eng/copyright>

READ THESE TERMS AND CONDITIONS CAREFULLY BEFORE USING THIS WEBSITE.

L'accès à ce site Web et l'utilisation de son contenu sont assujettis aux conditions présentées dans le site

<https://publications-cnrc.canada.ca/fra/droits>

LISEZ CES CONDITIONS ATTENTIVEMENT AVANT D'UTILISER CE SITE WEB.

Questions? Contact the NRC Publications Archive team at

PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca. If you wish to email the authors directly, please see the first page of the publication for their contact information.

Vous avez des questions? Nous pouvons vous aider. Pour communiquer directement avec un auteur, consultez la première page de la revue dans laquelle son article a été publié afin de trouver ses coordonnées. Si vous n'arrivez pas à les repérer, communiquez avec nous à PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca.

Titanium Foams based on a Powder Metallurgy Approach

Eric Baril, Louis-Philippe Lefebvre

National Research Council Canada/Industrial Materials Institute
75 de Mortagne, Boucherville, Quebec J4B 6Y4, CANADA

ABSTRACT

Metallic foams offer a combination of attractive properties such as low density, good specific mechanical properties, fluid permeability, high surface area, good thermal resistance, high electric conductivity, high energy absorption characteristics, etc. These materials have already been considered or used in various applications including structures, biomedical implants, high specific surface electrodes or catalysts, fluid control device, cryogenic gas storage applications, thermal protection systems, etc.

This paper presents the properties of titanium foam structures produced using a powder metallurgy approach. A metallic powder, a solid polymeric binder and a foaming agent are dry-mixed and molded into the desired shape. The molded powder is then heat-treated to foam, debind and sinter the material. Porous titanium structures with porosity between 50 and 70% were produced using this approach. This porous titanium manufacturing process offers significant production flexibility for the development of various applications. The foams can be easily machined, used as a coating on dense structures or coated with dense material. This paper presents the evolution of the structure during the process and the properties (structure, chemical composition, density, permeability, specific surface area, compression behavior) of titanium foams produced under different conditions. Prototypes (orthopedic and dental implants) produced using this process are also presented.