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Pore shape affected by gravity

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The pore shape in solid as a result of entrapment of a bubble by a solidification front is predicted in this work. Pore formation in solid influence microstructure of materials, and contemporary issues of biotechnologies, etc. It has been known that scaffolds were engineered to be bioactive or bioresorbable to enhance tissue growth. Scaffolds are also designed to induce bone formation and vascularization. These scaffolds are often porous, biodegradable materials that harbor different growth factors, drugs, genes or stem cells. In this work, extending previous models by accounting for mass and momentum transport across a coupled shape of the cap, and focusing on case 1 which indicates that solute transport is from the pore into surrounding liquid in the early stage, it shows that controlling gravity is an interesting and important factor in manufacturing porous materials. An increase in gravity can increase bond number, hydrostatic head, and ambient pressure. In contrast to hydrostatic head and ambient pressure, an increase in bond number decrease pore size and time for bubble entrapment. The predicted pore shape agrees with experimental data.

Biography

Peng-Sheng Wei has received his PhD in Mechanical Engineering Department at University of California, Davis, in 1984. He has been a Professor in the Department of Mechanical and Electro-Mechanical Engineering of National Sun Yat-Sen University, Kaohsiung, Taiwan, since 1989. He has contributed to advancing the understanding of and to the applications of electron and laser beam, plasma, and resistance welding through theoretical analyses coupled with verification experiments. Investigations also include studies of their thermal and fluid flow processes, and formations of the defects such as humping, rippling, spiking and porosity. He has published more than 80 journal papers, given keynote or invited speeches in international conferences more than 90 times. He is a Fellow of AWS (2007), and a Fellow of ASME (2000). He also received the Outstanding Research Achievement Awards from both the National Science Council (2004), and NSYSU (1991, 2001, 2004), the outstanding Scholar Research Project Winner Award from National Science Council (2008), the Adams Memorial Membership Award from AWS (2008), the Warren F. Savage Memorial Award from AWS (2012), and the William Irgang Memorial Award from AWS (2014). He has been the Xi-Wan Chair Professor of NSYSU since 2009, and Invited Distinguished Professor in the Beijing University of Technology, China, during 2015-2017.

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