ICCES, 2024, vol.30, no.3
DOI: 10.32604/icces.2024.012380

PROCEEDINGS

Microfluidic Fabrication of Various Ceramic Microparticles

Chenchen Zhou[1,2], Shuaishuai Liang[3], Bin Qi[3], Chenxu Liu[2] and Nam-Joon Cho[1,*]

[1]School of Materials Science and Engineering, Nanyang Technological University, 639798, Singapore
[2]Department of Mechanical Engineering, Tsinghua University, Beijing, 100084, China
[3]School of Mechanical Engineering, University of Science and Technology Beijing, Beijing, 100083, China
*Corresponding Author: Nam-Joon Cho. Email: namjoon.cho@gmail.com

ABSTRACT

Micro tools/parts are attracting increasing attention due to the miniaturization evolutionary tendency in many fields, whose functionalities are critically determined by their materials and shapes [1- 5]. Sharp-edged ceramic microparticles have great prospects to be used as micromachining tools and micro components. However, it remains a huge challenge to fabricate nontransparent ceramic sharp-edged microparticles in a high-throughput way while taking their shape complexity, precision, and strength into account [6-8]. Herein, we present an online mixing and in-situ polymerization strategy: "one-pot microfluidic fabrication" along with two novel microfluidic device fabrication methods: "groove & tongue" and sliding assembling, succeeding in obtaining both transparent and nontransparent microparticles with great shape diversity, complexity, precision, density and strength. The throughput rate is increased by 2 orders of magnitude higher than other methods. Compression and scratch tests demonstrate the promising potential of the obtained microparticles being of practical use in a wide spectrum of applications, including micromachining, microelectronics, microrobots, microsurgery, etc.

KEYWORDS

Microfluidics; microscale fabrication; ceramic microparticles; high-throughput manufacturing; miniaturization; one-pot fabrication; groove & tongue assembly

Acknowledgement: We thank J. Chan, T. Salim, Y. Lim, D. Ang, W. Liu, Z. Gan, S. Tan and Y. Su for the technical support. We also appreciate the valuable discussion with Y. Tan and Y. Cao.

Funding Statement: This study received funding support from the Ministry of Education in Singapore under grant MOE-MOET32022-0002 and the National Natural Science Foundation of China under grants No. 51905033 and 52105193.

Conflicts of Interest: The authors declare that they have no conflicts of interest to report regarding the present study.

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