Mechanical Properties and chemical stability of Roof Tiles: a mixture of Cathode-Ray Tube (CRT) waste glass and Allophane material from Bamboutos (Cameroon) fired at different temperatures

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Abstract

In biosensing, bio-receptors are immobilized and labeled on the surface requiring specific manual steps. Microfluidics have paved the way for packing these lab-tasks together in a point-of-care (POC) device. However, conventional microfabrication techniques are tedious, expensive and requires cleanroom facilities [1,2]. To overcome these limitations, 3D printing (3DP) offers a rapid and inexpensive prototyping allowing the conversion of a computer-assisted design (CAD) into a physical object in a single process with 3D flow distribution and multilevel format. Despite these advantages, 3DP printing request a feasible design for testing and in most cases, researchers end-up using a trial-error approach [3-5]. In this study, we used 3D multiphase flow simulations to go beyond trial-error fabrication. From the outputs of the simulation, 3D printed microfluidic chips were fabricated for its subsequent testing. Using this approach, the optimum design can be found in a quicker and more efficient way, accelerate the time-to-market, and reduce the operation costs of the entire process (figure). Besides, the performance of different printer technologies was evaluated in terms of feature size, accuracy, and suitability for mass manufacturing. Laminar flow was studied to assess their suitability for microfluidics. As a proof of concept, 2 different applications are presented: (1) direct 3D printed microfluidic chip with organic biosensors for the assessment of the immune reaction against biologicals targeted to inflammatory pathologies; (2) a compact capillary-driven microfluidic device for the appropriate delivery of reagents on the biosensing platform without using external pumps and valves.

Biography:

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