

Supplementary material

Microfluidic Fabrication of Gadolinium-Doped Hydroxyapatite for Theragnostic Applications

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Tables

Table S1. Employed quantities for the different stocks A_i. Concentrations were adjusted to meet the proposed ratios between Ca and Gd.

	m_{CaCl_2} [g]	m_{GdCl_3} [g]
Ca	0.1714	-
Ca:Gd (1:1)	0.0857	0.2871
Ca:Gd (1:10)	0.0039	0.1305

Table S2. Employed quantities for the stock B and C.

	V [mL]	m [g]
PPG	1.56	-
CTAB	-	0.031
NaNO ₂	-	2.151
Na ₃ PO ₄	-	0.413

Table S3. Quantities and concentrations of each compound during the microfluidic synthesis process. The “i” subscript denotes the values corresponding to the outflow of the first microchip, “m” represent the values at the entrance of the second microrreactor and “f” corresponds to the final mixture.

	M [g mol ⁻¹]	V [mL]	m [g]	n [mol]	ρ [g mL ⁻¹]	V_i [mL]	$[M]_i$ [mol L ⁻¹]	V_m [mL]	$[M]_m$ [mol L ⁻¹]	V_f [mL]	$[M]_f$ [mol L ⁻¹]
PPG	425	0.39	-	$92 \cdot 10^{-5}$	1.004	5	$184.1 \cdot 10^{-3}$	10	$92 \cdot 10^{-3}$	15	$61.4 \cdot 10^{-3}$
CTAB	364.45	-	$7.8 \cdot 10^{-3}$	$2.1 \cdot 10^{-5}$	-	5	$4.3 \cdot 10^{-3}$	10	$2.1 \cdot 10^{-3}$	15	$1.4 \cdot 10^{-3}$
NaNO ₂	69	-	$537.6 \cdot 10^{-3}$	$779.2 \cdot 10^{-5}$	-	5	$1558.4 \cdot 10^{-3}$	10	$779.2 \cdot 10^{-3}$	15	$519.5 \cdot 10^{-3}$
CaCl ₂	110.98	-	$42.9 \cdot 10^{-3}$	$38.6 \cdot 10^{-5}$	-	5	$772.3 \cdot 10^{-3}$	10	$38.6 \cdot 10^{-3}$	15	$25.7 \cdot 10^{-3}$
Na ₃ PO ₄	163.94	-	$103.3 \cdot 10^{-3}$	$63 \cdot 10^{-5}$	-	-	-	5	$124 \cdot 10^{-3}$	15	$41.9 \cdot 10^{-3}$

Figures

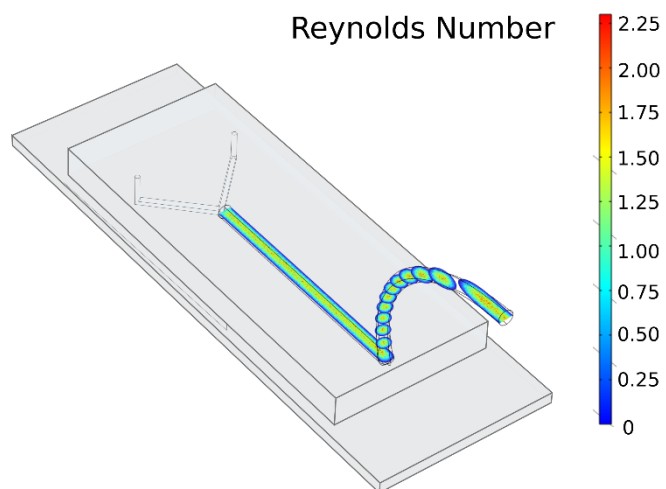


Figure S1. Reynolds number values inside the channel of the first microreactor. The low Reynold values probe that laminar flow is assured all through the process.

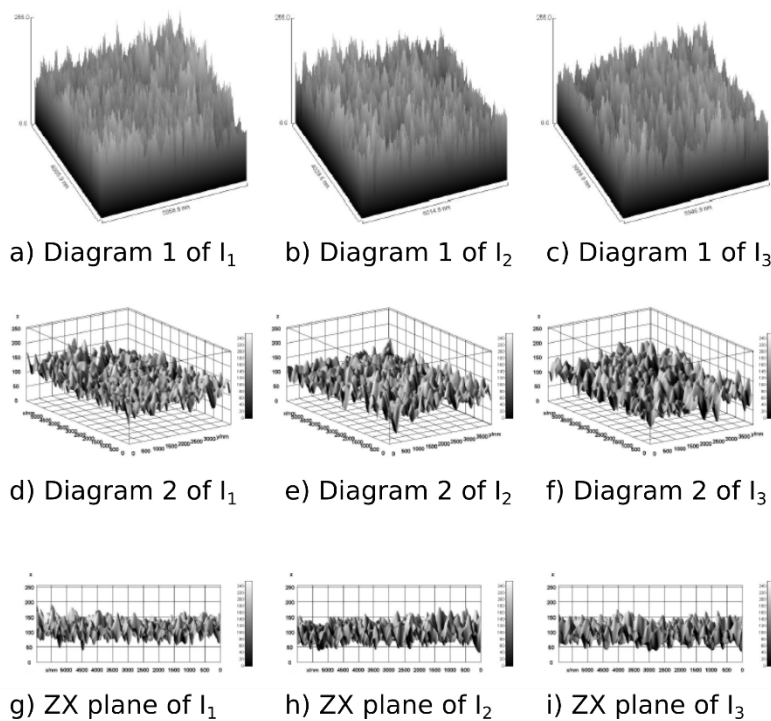


Figure S2. FE-SEM Image processing for pure HAp.

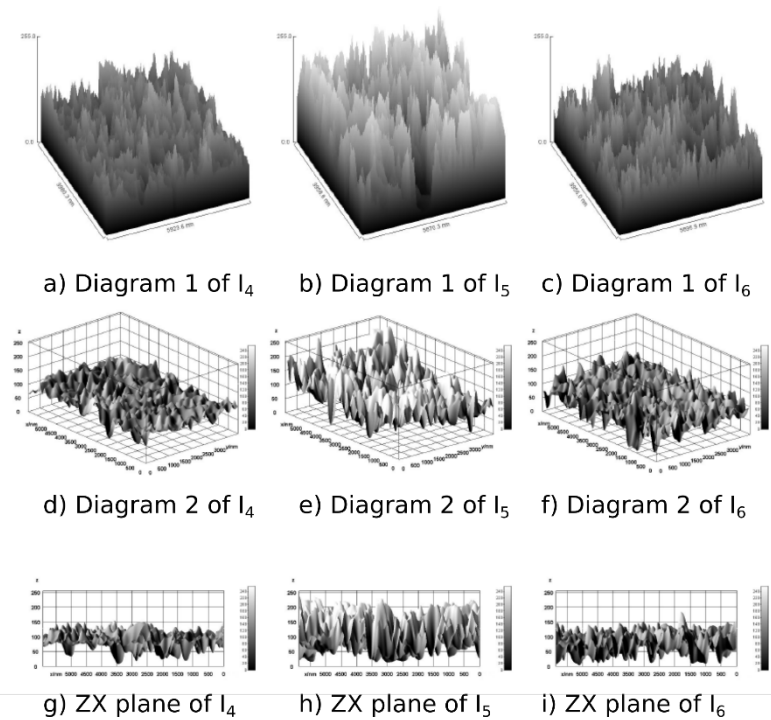


Figure S3. FE-SEM Image processing for HAp:Gd1.

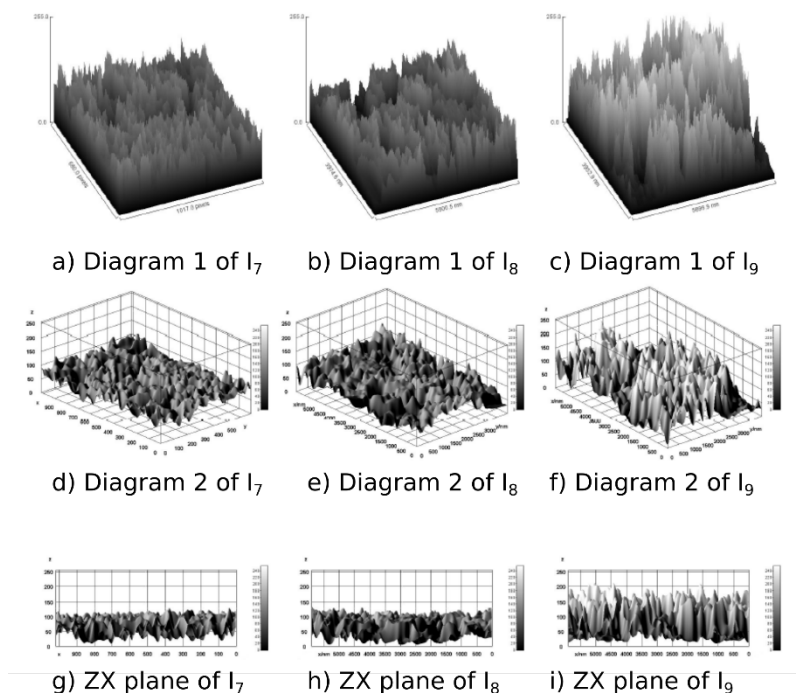


Figure S4. FE-SEM Image processing for HAp:Gd10.

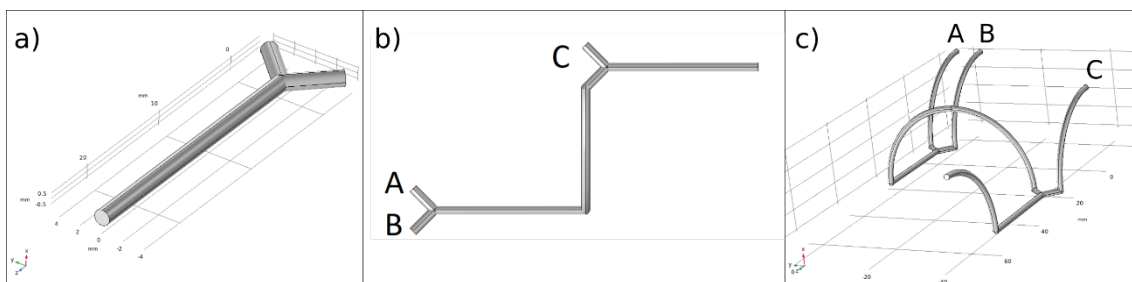


Figure S5. Chip disposition. Figure a) shows the tridimensional representation of the simulated microchip. Image b) represents the two microreactor connected in series and Figure c) shows the 3D model used for the Computational Fluid Dynamics of the system.

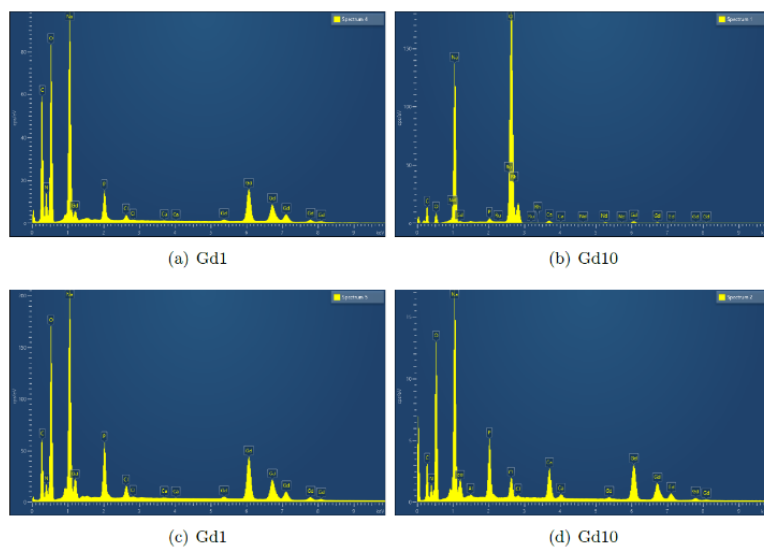


Figure S6. EDX results for HAp:Gd1 (a and c) and for HAp:Gd10 (b and d).

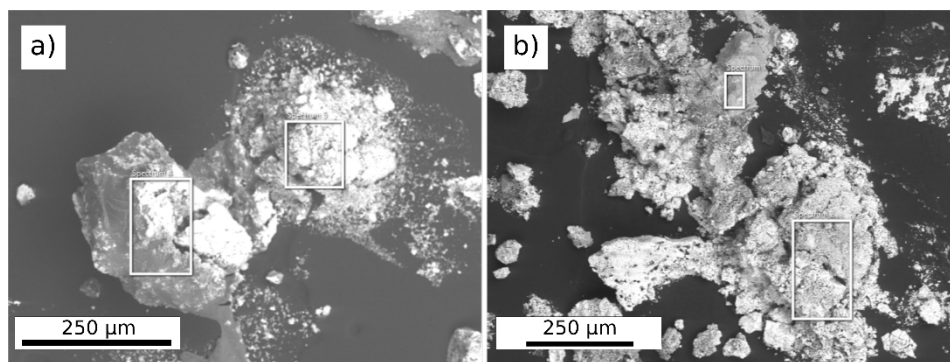


Figure S7. Scanning Electron Microscopy images of the two samples containing Gd. a) HAp:Gd1, b) HAp:Gd10. Inner rectangles represent the areas where the EDX technique was performed.