Supplementary

Optimizing Design Parameters of PLA 3D-Printed Scaffolds for Bone Defect Repair

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The following tables display the rigidity (MPa) and yield strength (MPa) for each scaffold models.

Table S1. Rigidity in MPa for each combination.

Rigidity in MPa for models with SMALL and SQUARE pores						
Pore orientation	Crosswise			Lengthwise		
Printing orientation	90°	0°	FEA	90°	0°	FEA
Specimen #1	982	535		772	349	
Specimen #2	974	512		775	398	
Specimen #3	922	475	802	729	377	800
Specimen #4	935	534		760	356	
Specimen #5	932	541		677	356	
Average	949	519		743	367	
Standard deviation	27	27		41	20	

Rigidity in MPa for models with MEDIUM and SQUARE pores						
Pore orientation	Crosswise			Lengthwise		
Printing orientation	90°	0°	FEA	90°	0°	FEA
Specimen #1	765	387		826	386	
Specimen #2	805	448		758	367	
Specimen #3	768	448	758	743	368	799
Specimen #4	802	431		711	395	
Specimen #5	774	408		701	373	
Average	783	424		748	378	
Standard deviation	19	26		50	12	

Rigidity in MPa for models with LARGE and SQUARE pores						
Pore orientation	Crosswise			Lengthwise		
Printing orientation	90°	0°	FEA	90°	0°	FEA
Specimen #1	617	533		797	303	
Specimen #2	650	389		811	292	
Specimen #3	688	540	725	728	540	782
Specimen #4	652	555		720	505	
Specimen #5	689	381		711	606	
Average	659	480		753	449	
Standard deviation	30	87		47	143	

Rigidity in MPa for models with SMALL and CIRCULAR pores						
Pore orientation	Crosswise			Lengthwise		
Printing orientation	90°	0°	FEA	90°	0°	FEA
Specimen #1	950	508		788	365	
Specimen #2	974	526		730	354	
Specimen #3	1011	520	797	757	394	808
Specimen #4	942	511		706	391	
Specimen #5	929	510		765	379	
Average	961	515		749	376	
Standard deviation	32	7		32	17	

Rigidity in MPa for models with MEDIUM and CIRCULAR pores						
Pore orientation	Crosswise			Lengthwise		
Printing orientation	90°	0°	FEA	90°	0°	FEA
Specimen #1	733	388		672	439	
Specimen #2	848	551		775	572	
Specimen #3	732	563	773	734	613	804
Specimen #4	867	411		873	570	
Specimen #5	872	593		808	431	
Average	810	501		772	525	
Standard deviation	71	94		76	84	

Rigidity in MPa for models with LARGE and CIRCULAR pores						
Pore orientation	Crosswise			Lengthwise		
Printing orientation	90°	0°	FEA	90°	0°	FEA
Specimen #1	696	491		794	361	
Specimen #2	610	580		625	504	
Specimen #3	678	584	726	654	446	786
Specimen #4	677	340		615	646	
Specimen #5	610	324		556	371	
Average	654	464		649	465	
Standard deviation	41	126		88	116	

Since the material is defined as "linear" in the FE model, there is no yield strength value associated to the simulation.

Table S2. Yield strength (MPa) for each combination.

Yield strength in MPa for models with SMALL and SQUARE pores						
Pore orientation	Crosswise			Lengthwise		
Printing orientation	90°	0°	FEA	90°	0°	FEA
Specimen #1	44	31		39	20	
Specimen #2	44	30		40	20	
Specimen #3	48	31	N/A	38	19	N/A
Specimen #4	44	30		41	21	
Specimen #5	41	30		35	20	
Average	44	30		39	20	
Standard deviation	2	0		2	1	

Yield strength in MPa for models with MEDIUM and SQUARE pores						
Pore orientation	Crosswise			Lengthwise		
Printing orientation	90°	0°	FEA	90°	0°	FEA
Specimen #1	35	24		33	23	
Specimen #2	34	25		36	24	
Specimen #3	33	26	N/A	35	23	N/A
Specimen #4	35	28		35	23	
Specimen #5	33	25		34	24	
Average	34	26		35	23	
Standard deviation	1	1		1	0	

Yield strength in MPa for models with LARGE and SQUARE pores						
Pore orientation	Crosswise			Lengthwise		
Printing orientation	90°	0°	FEA	90°	0°	FEA
Specimen #1	27	22		33	20	
Specimen #2	28	20		33	20	
Specimen #3	29	21	N/A	34	19	N/A
Specimen #4	26	20		31	19	
Specimen #5	29	20		32	19	
Average	27	21		33	19	
Standard deviation	1	1		1	1	

Yield strength in MPa for models with SMALL and CIRCULAR pores						
Pore orientation	Crosswise			Lengthwise		
Printing orientation	90°	0°	FEA	90°	0°	FEA
Specimen #1	45	31		37	19	
Specimen #2	41	34		37	22	
Specimen #3	43	31	N/A	36	22	N/A
Specimen #4	42	32		35	18	
Specimen #5	41	31		36	24	
Average	42	32		36	21	
Standard deviation	2	2		1	2	

Yield strength in MPa for models with MEDIUM and CIRCULAR pores						
Pore orientation	Crosswise			Lengthwise		
Printing orientation	90°	0°	FEA	90°	0°	FEA
Specimen #1	31	23		35	20	
Specimen #2	35	25		36	21	
Specimen #3	32	25	N/A	36	24	N/A
Specimen #4	33	23		35	21	
Specimen #5	34	25		34	22	
Average	33	24		35	22	
Standard deviation	2	1		1	1	

Yield strength in MPa for models with LARGE and CIRCULAR pores						
Pore orientation	Crosswise			Lengthwise		
Printing orientation	90°	0°	FEA	90°	0°	FEA
Specimen #1	27	20		32	20	
Specimen #2	25	20		29	15	
Specimen #3	27	19	N/A	28	20	N/A
Specimen #4	25	19		26	20	
Specimen #5	24	19		23	21	
Average	26	19		28	19	
Standard deviation	1	1		3	2	

The following table presents four tables with t-test results comparing the mean rigidities for all models. The significance is determined at $p < 0.05$. In the upper left corner, rigidities of crosswise and lengthwise models are compared for square pores only, for each pore size (small, medium, large) and each printing orientation (0° or 90°). In the upper right corner, the same comparison is made, this time for circular pore models. The lower left corner presents the t-test results comparing rigidities of circular and square pore shapes for crosswise models, for all pore sizes (small, medium, large) and all printing orientations (0° or 90°). The same is done on the lower right corner for lengthwise pore orientation.

Table S3. Statistical analyses comparing rigidities between models.

Comparing rigidities: square pore shape					Comparing rigidities: circular pore shape			
Pore size	Printing or.	Crosswise vs lengthwise	Significant?		Pore size	Printing or.	Crosswise vs lengthwise	Significant?
small	0°	0,000	yes		small	0°	0,000	yes
small	90°	0,000	yes		small	90°	0,000	yes
medium	0°	0,013	yes		medium	0°	0,693	no
medium	90°	0,197	no		medium	90°	0,338	no
large	0°	0,697	no		large	0°	0,911	no
large	90°	0,007	yes		large	90°	0,813	no

Comparing rigidities: crosswise pore orientation					Comparing rigidities: lengthwise pore orientation			
Pore size	Printing or.	Circular vs square	Significant?		Pore size	Printing or.	Circular vs square	Significant?
small	0°	0,731	no		small	0°	0,461	no
small	90°	0,538	no		small	90°	0,778	no
medium	0°	0,146	no		medium	0°	0,016	yes
medium	90°	0,450	no		medium	90°	0,563	no
large	0°	0,824	no		large	0°	0,849	no
large	90°	0,820	no		large	90°	0,057	no

The following table presents four tables with t-test results comparing the mean yield strength for all models. It follows the same model as Table S3.

Table S4. Statistical analyses comparing yield strengths between models.

Comparing yield strengths: square pore shape			
Pore size	Printing or.	Crosswise vs lengthwise	Significant?
small	0°	0,000	yes
small	90°	0,006	yes
medium	0°	0,021	yes
medium	90°	0,358	no
large	0°	0,025	yes
large	90°	0,000	yes

Comparing yield strengths: circular pore shape			
Pore size	Printing or.	Crosswise vs lengthwise	Significant?
small	0°	0,000	yes
small	90°	0,000	yes
medium	0°	0,014	yes
medium	90°	0,009	yes
large	0°	0,955	no
large	90°	0,228	no

Comparing yield strengths: crosswise pore orientation			
Pore size	Printing or.	Circular vs square	Significant?
small	0°	0,1434	no
small	90°	0,2042	no
medium	0°	0,1641	no
medium	90°	0,0026	yes
large	0°	0,0252	yes
large	90°	0,0544	no

Comparing yield strengths: lengthwise pore orientation			
Pore size	Printing or.	Circular vs square	Significant?
small	0°	0,0000	yes
small	90°	0,0637	no
medium	0°	0,0493	yes
medium	90°	0,4333	no
large	0°	0,5782	no
large	90°	0,0240	yes