

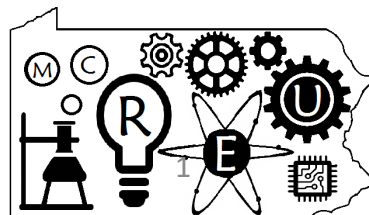
Relationship Between Nanofiller Structures and Transport Properties of Maghemite-Thermoset Composites

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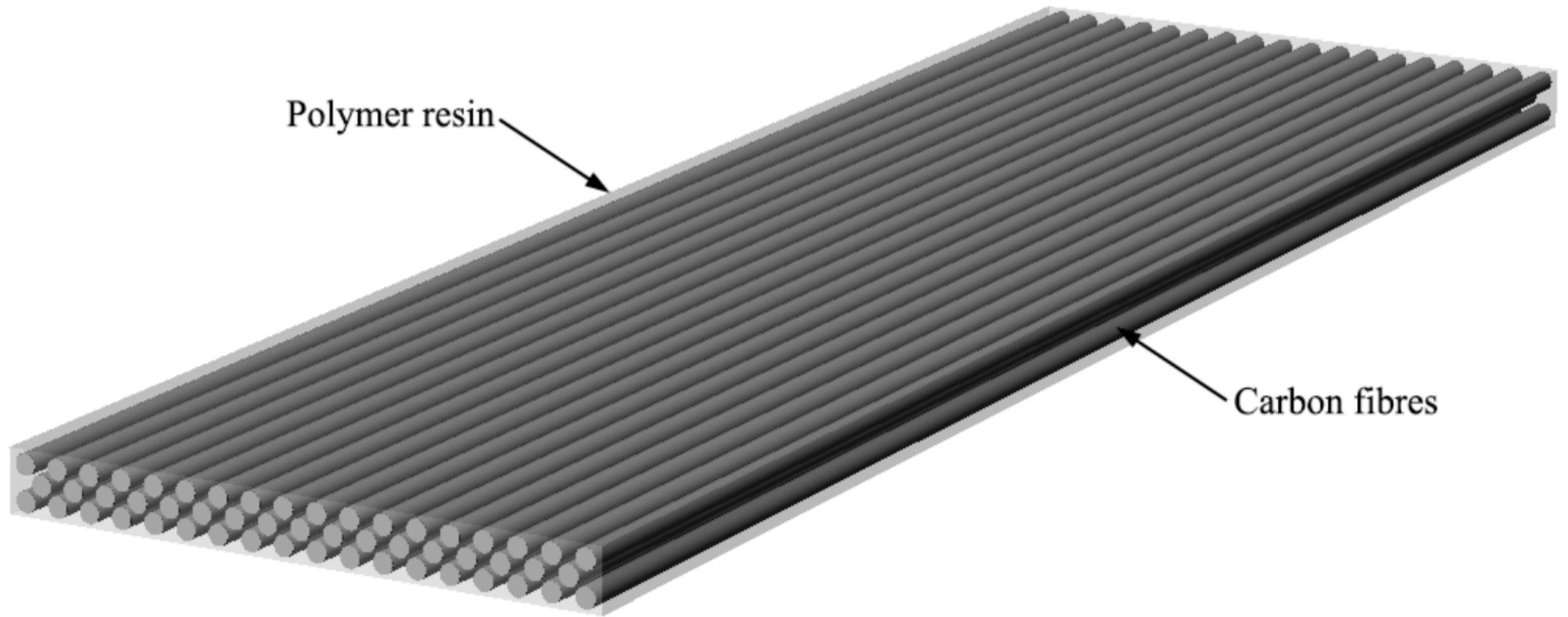
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The Pennsylvania State University

July 29, 2020



Introduction



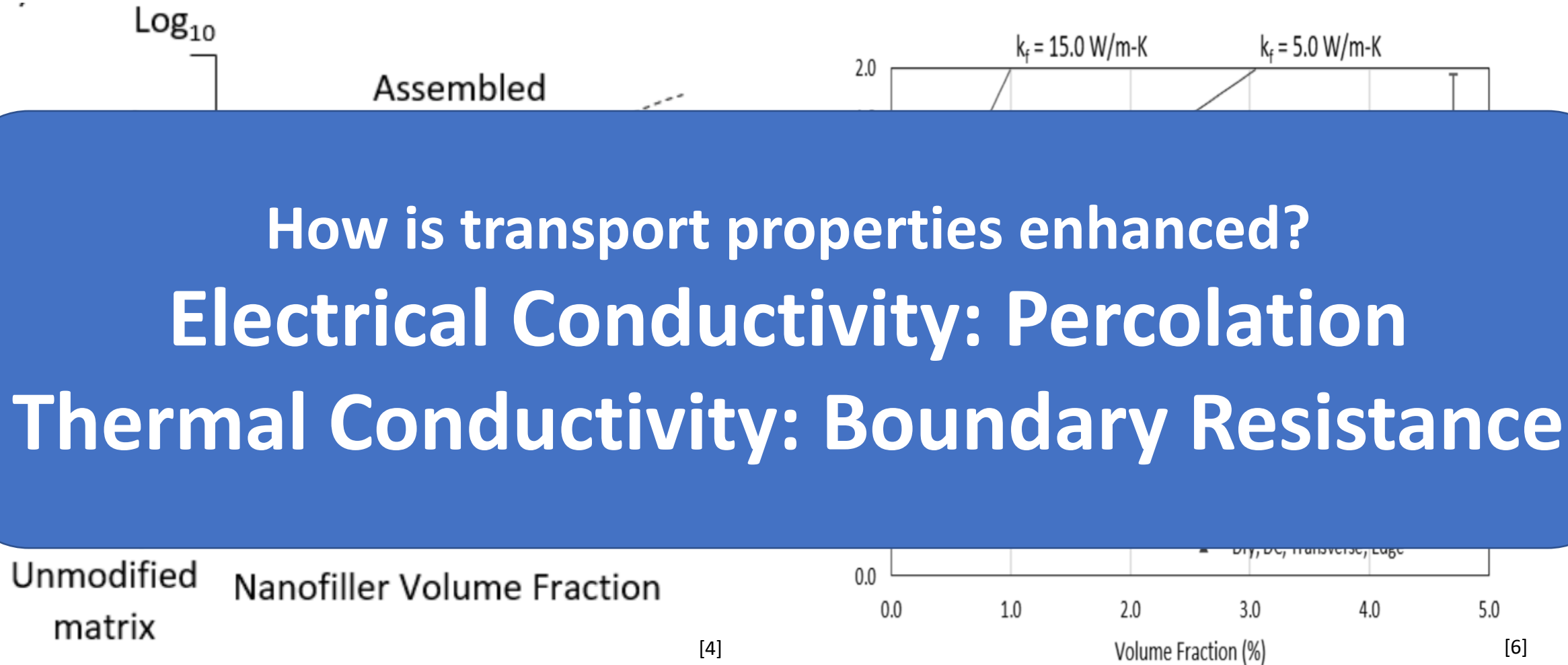
[3]

[1] <https://www.sott.net/article/330076-Lightning-hits-airplane-in-rare-strike-over-Iceland>

[2] Y. Guo et al, "Eliminating lightning strike damage to carbon fiber composite structures in Zone 2 of aircraft by Ni-coated carbon fiber nonwoven veils," *Composites Science and Technology*, vol. 169, pp. 95-102, 2019.

[3] Y. Liu, B. Zwingmann and M. Schlaich, "Carbon Fiber Reinforced Polymer for Cable Structures—A Review," *Polymers*, vol. 7, (10), pp. 2078-2099, 2015.

Challenges

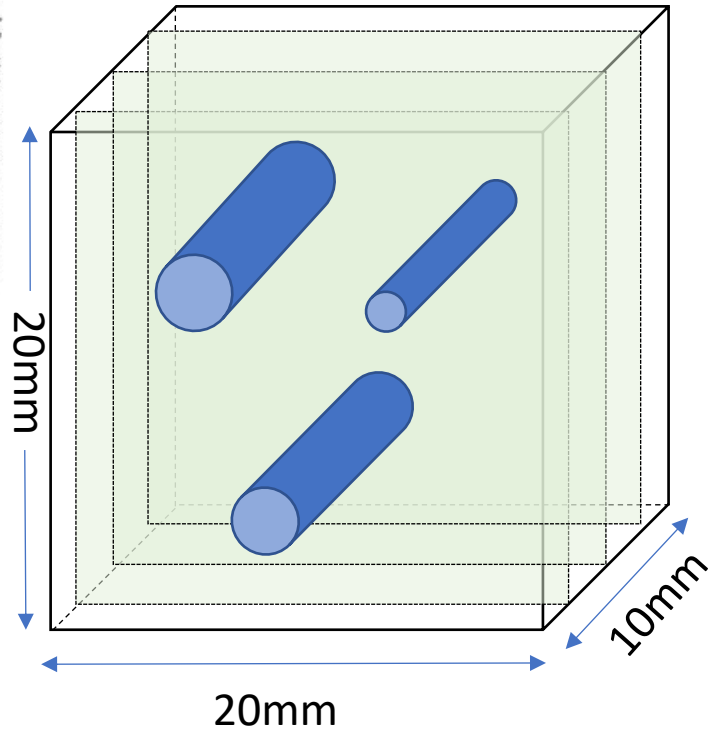
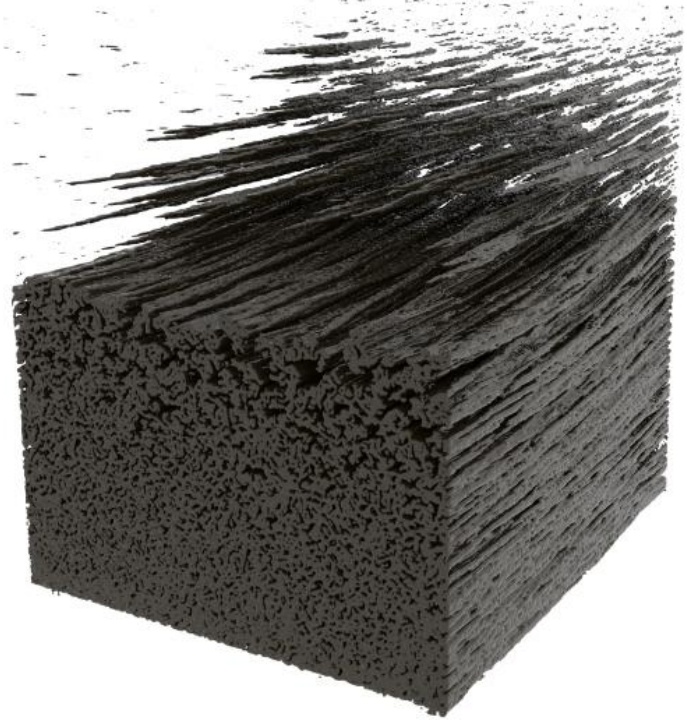


[4] Wu, Ladani, Zhang, Kinloch, Zhao, Ma, Zhang, Mouritz, Ghorbani, Wang, Epoxy nanocomposites containing magnetite-carbon nanofibers aligned using a weak magnetic field, Polymer (Guildf). (2015) 25–34.

[5] J Haibat. Processing of multi-walled carbon nanotubes as magnetic additives for polymer nanocomposites. MS thesis, The Pennsylvania State University, 2016

[6] M Spencer, Tailorable manufacturing of polymer nanocomposites using oscillating magnetic fields. PhD thesis, The Pennsylvania State University, 2019

Image Processing

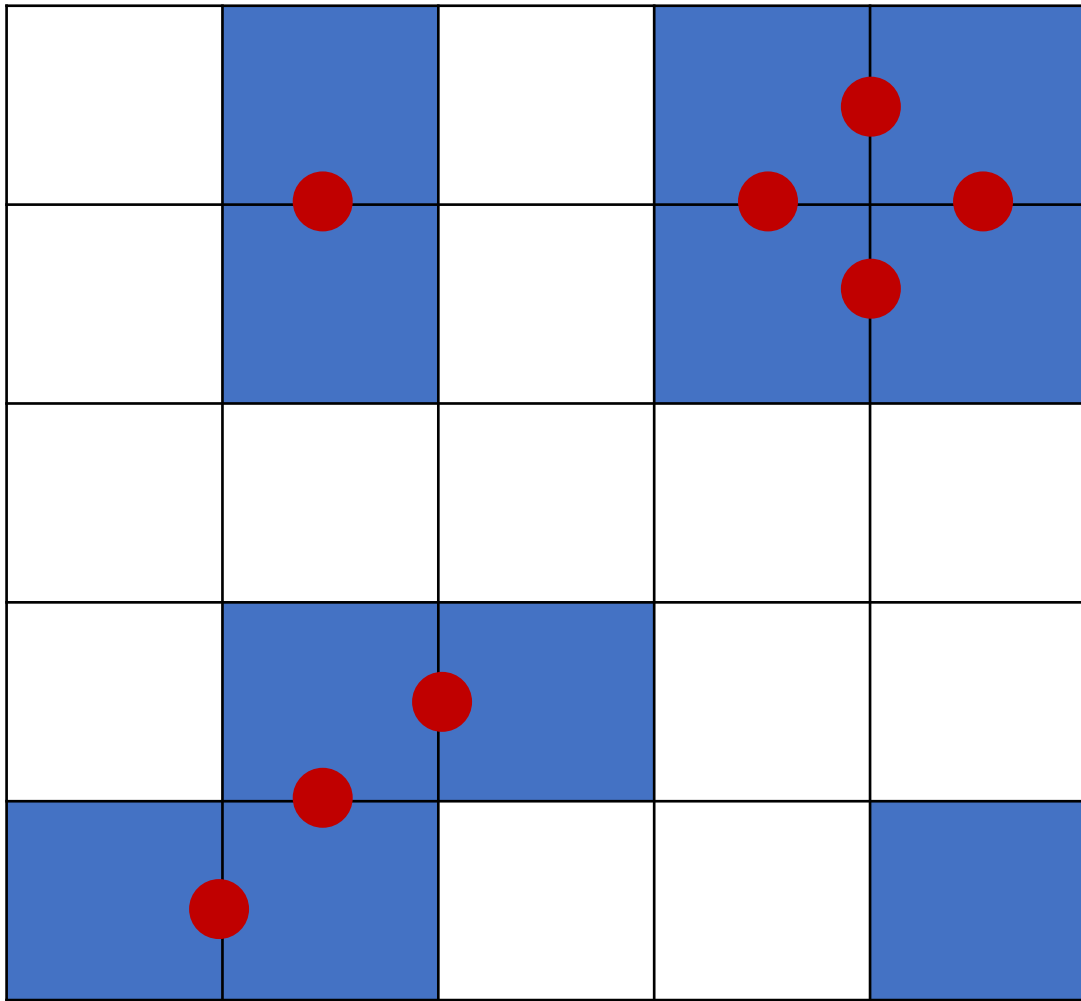


	Area	Perim.	Circ.	AR	Round	Solidity
1	355	112.225	0.354	2.837	0.353	0.720
2	268	97.397	0.355	1.812	0.552	0.693
3	525	169.480	0.230	2.444	0.409	0.550
4	47					0.04
5	34					0.48
6	12					0.84
7	6					0.57
8	10					0.20
9	14					0.38
10	32					0.26
11	22					0.11
12	65					0.84
13	37					0.90
14	37					0.14
15	91					0.90
16	410	114.953	0.390	1.525	0.656	0.668
17	1	2.828	1.000	1.000	1.000	1.000
18	4	7.071	1.000	1.468	0.681	0.800
19	89	42.042	0.633	2.331	0.429	0.832

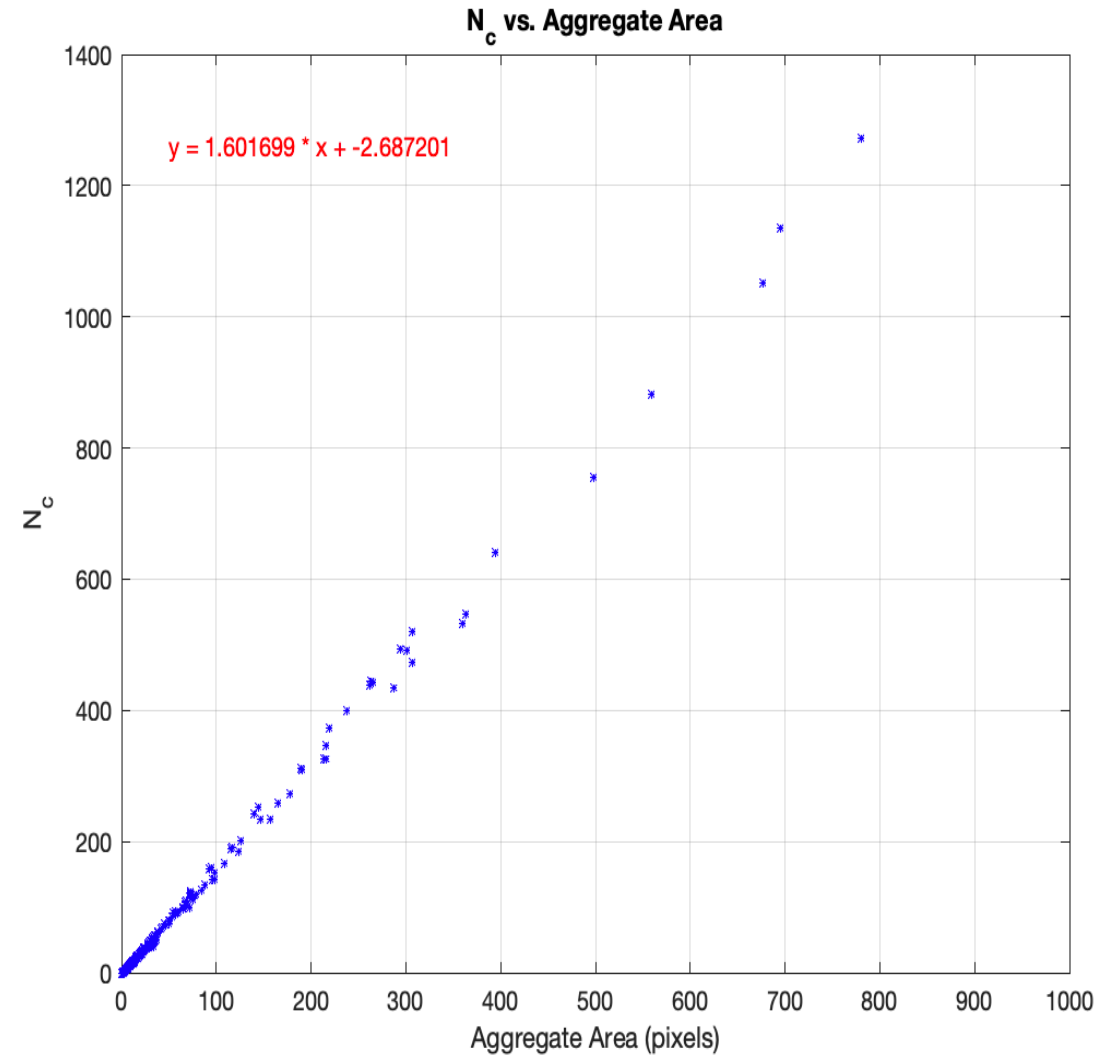
Correction factor:

$$\frac{v_{measured}}{v_{microCT}}$$

Image Processing



● N_c : Number of interparticle contact



Summary and Future Work

- Area vs. Number of interparticle contact is linearly correlated
- Improve accuracy through training method
- Image processing of various volume fraction and alignment
- Study the structure property relationship

Thank you