





Classes Schedule

- 1. Kickoff meeting. Introduction. Simple Grain Growth Cellular Automaton
- 2. Inclusions, precipitations feature
- 3. Consideration of grain curvature
- 4. Substructures
- 5. Boundaries detection
- 6. Leftovers, project submitting



Spherical features

Inclusions - compounds of nonmetals (O, S, C, H, N) with metals, impurities in

material

Decreasing quality of material

- Cracking
- **Fatigue**

- Precipitations small, uniformly dispersed particles of a second phase in first phase matrix
 - Precipitations hardening



Average Diam. = 5.7 µm Ca=50.3%, S=36%, Al=7.9%, Si=2.2%, Mn=2.3% Mg=1.4%



Average Diam. = 2.5 µm



Average Diam. = 11 µm Al=71.3%,Mn=7.9%, Ca=5.1%, Na=1.6%, Mg=1.1%, Si=5.5%, Ti=4.7%,



Average Diam. = 32.9 µm Na=21.3%, Zr=2.3%.



Average Diam. = 55.2 µm Si=47.1%, Al=29.9%, K=16.8%, Zr = 3.8% Mg=1.2%, Mn=1.2%



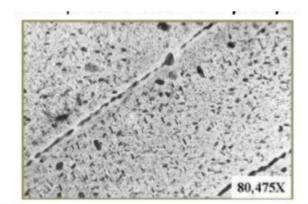
Average Diam. = 12.7 µm Al=49.8%, Mg=29.8%, S=7.2%, Si=2.8% Ca=6.7%, Mn=2.1%



Ca=35.5%, Al=24.7%, S=17.9%, Mn=12%, Mg=6.6%,



Average Diam. = 21.3 µm K=52.3%, Mg=8.0%, Ti=7.6% Mn =1.8% Na=1.2%, Al=1.0%

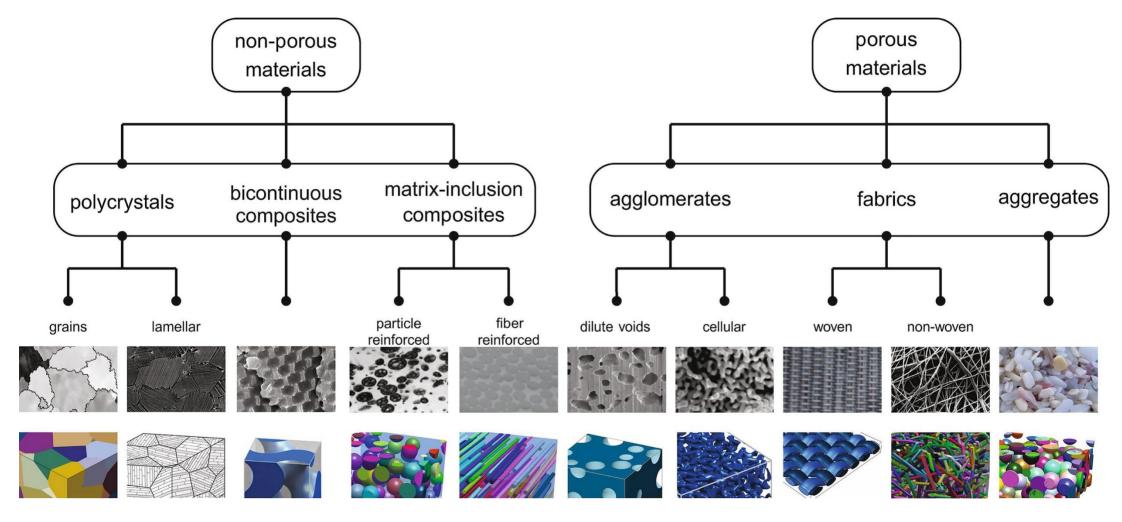




Digital Material Representation





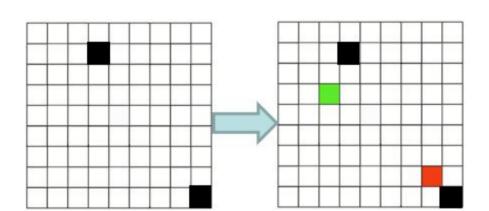


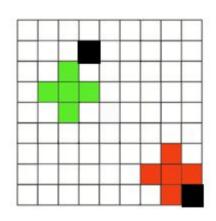


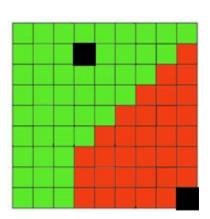
Movie















- User can specify no. of inclusions
- Inclusions should have round shape (circle)
- User can specify min and maximum radius
- Each inclusion should have random radius in range between selected min and max
- Add another internal variable "phase" to the model of the cell the inclusions are another phase, include the new variable in the import / export functionality