Effects of fillers on the properties of liquid silicone rubbers (LSRs)

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Particle Size
- Smaller is Better
- >10μm: Degradants
- 1-10μm: Diluents
- 0.1-1μm: Semi-reinforcing
- 0.01-0.1μm: Reinforcing

Particle Surface Area
- Bigger is Better

Particle Shape
- Broader (and Longer) is Better
- Isometric
- Platy
- Fiber
- Acicular
- Cluster

Particle Surface Activity
- More is Better
- Poor contact
- Good contact
- Bonded
- Matrix wetting
- Matrix adhesion
SiO$_2$ reinforces the networks with no increase in permittivity ($\varepsilon_{r,SiO_2} \sim 3.9$).

The inhomogeneous compatibility of the unmodified multiwalled carbon nanotubes (MWCNTs) causes the risk of conductivity.

Micron-sized CaCu$_3$Ti$_4$O$_{12}$ CCTO ($\varepsilon_{r,CCTO} \sim 10000$) decreases the mechanical properties of the composites.

Polymer with chemical crosslinks (red) forms a filled, elastic network

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**Tear Resistance**

- Well Bound
- Smaller Size / Higher Surface Area
- Higher Aspect Ratio / Greater Structure
- Large Poorly Bound
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