



Characterization of Nanofluid Spray Cooling

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20th September, 2019

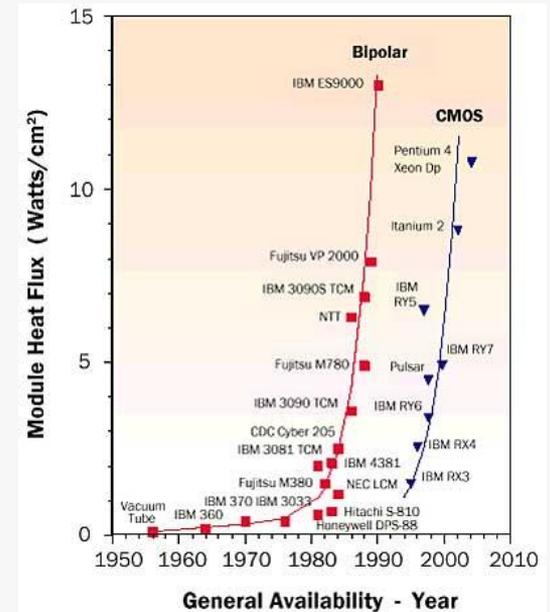
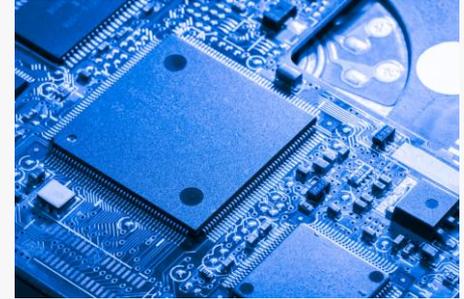
Motivation and Context

Over the last few years there have been big developments in electronic devices. Electronic components are becoming smaller and more powerful.

With this, there's a rise in their heat fluxes that compromises their performance, without proper cooling.

This is where standard cooling technologies aren't viable enough.

New cooling processes like **Nanofluid Spray Cooling** takes place, but little studies have been made so far and sometimes their conclusions show opposite cooling performance behaviors.

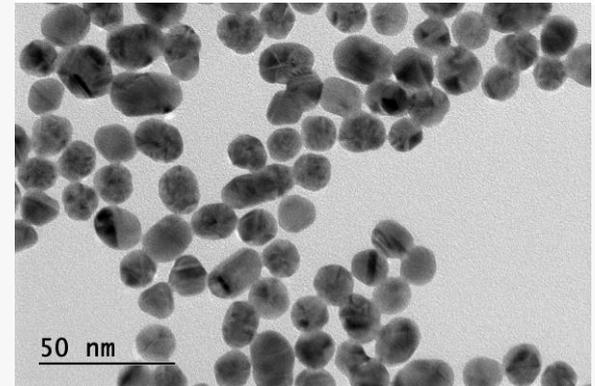
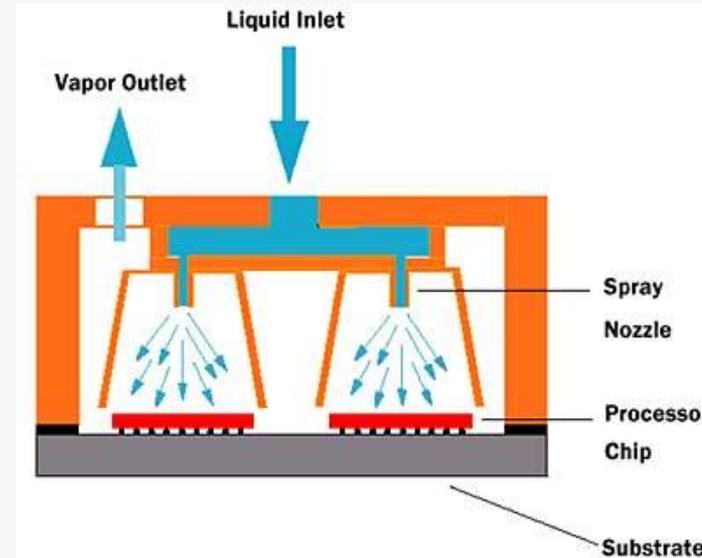


Nanofluid Spray Cooling

Spray cooling is a way to remove high heat fluxes from hot surfaces. This depends on a large number of parameters:

- Nozzle type
- Surface material
- Droplet dynamics
- Base liquid

Nanofluids are composed by nano scaled particles, such as metals or oxides, that have higher thermal conductivity, thus promoting the base fluid heat transfer.

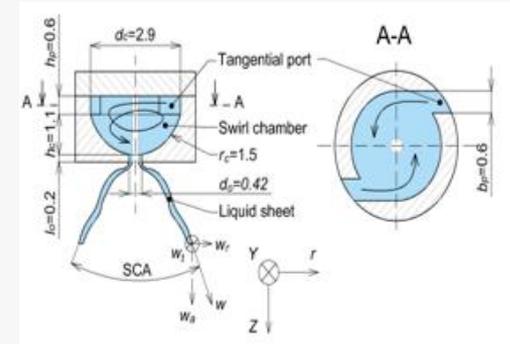


Gold nanoparticle suspension

Study Objectives

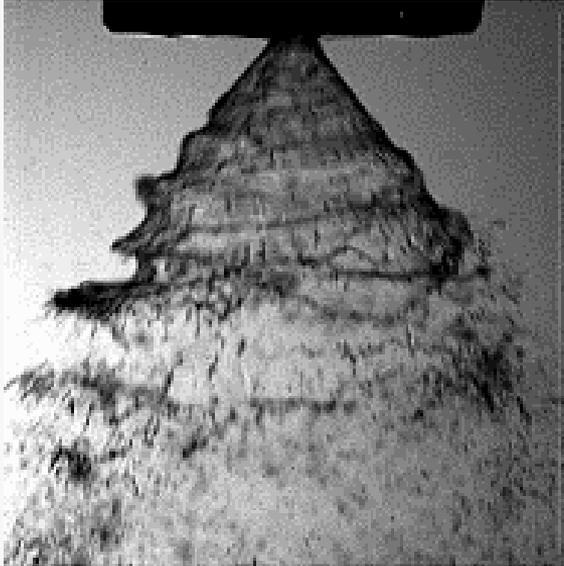
- Main parameters affecting Nanofluid Spray Cooling performance when changing their nanoparticle concentration.
- Do they offer better Cooling Performance?
- Viable Solution?

Experimental Setup

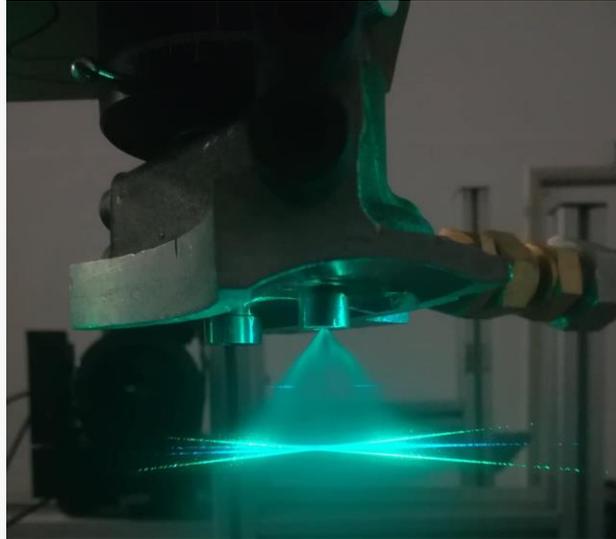


Experimental Method – Droplet Dynamics

- Spray Visualization Technique

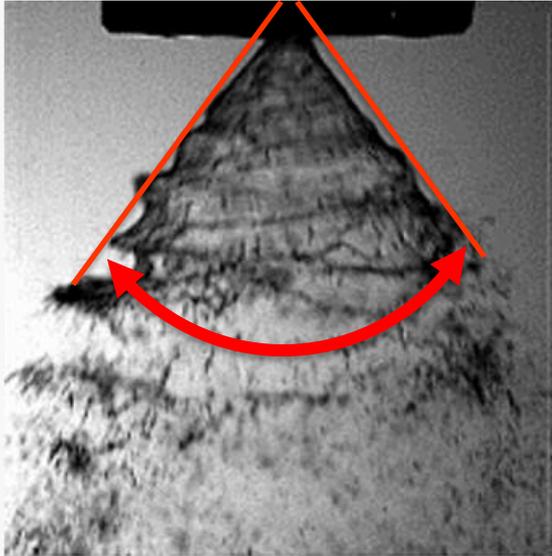


- Phase Doppler Anemometry



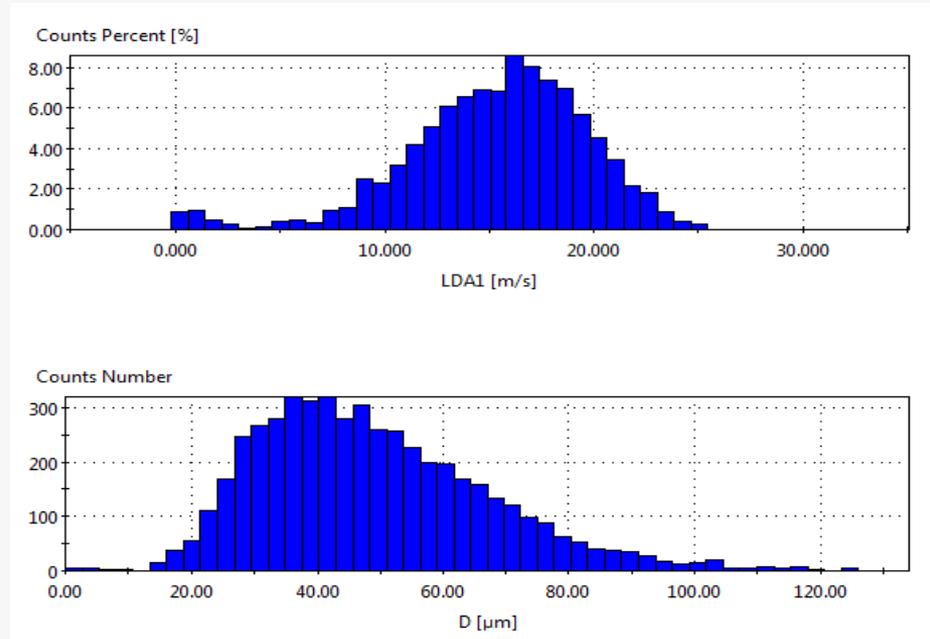
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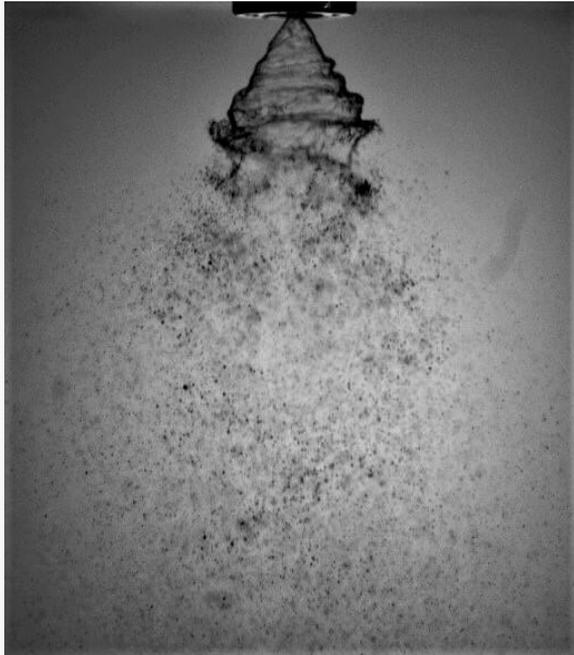


Spray Cone Angle

- Phase Doppler Anemometry



Droplets Diameter and Velocity Distributions



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