



東京大学  
THE UNIVERSITY OF TOKYO

# Hot extrusion for fabrication of Graphite/Al6061 composite and determination of their mechanical and tribological property



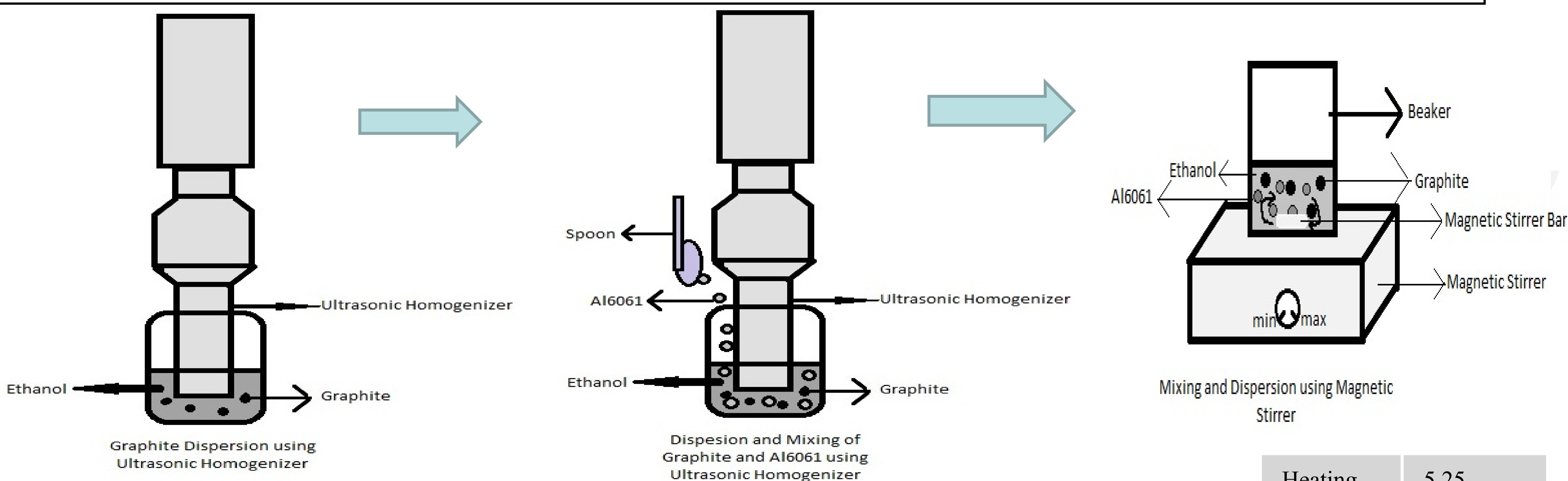
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## 1. Introduction

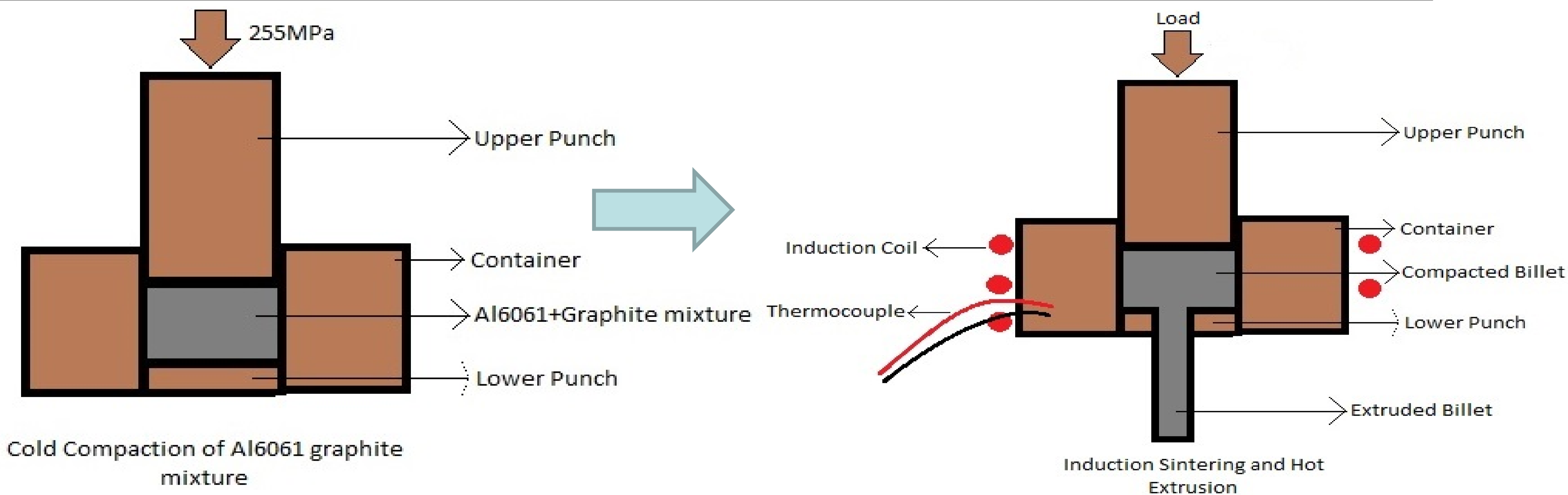
Al6061 is a popular material used in manufacturing of lightweight structural component of aircraft, rescue ladder, helicopter rotor components. Though it is quite popular material, but little work has been reported in improving its mechanical and tribological property as metal matrix composite. As reinforcement graphite, fullerene, graphene is widely popular due to their excellent mechanical and tribological properties but less studied for reinforcement for Al6061. But fullerene and graphene is highly expensive making it not suitable for commercial use. Graphite on the other hand is very cheap and acts as excellent reinforcement making it suitable reinforcement for commercial use.

## 2. Uniform dispersion of graphite and preparation of Al6061/Graphite composite powder

- For using graphite as suitable reinforcement uniform mixing of graphite with Al6061 is required.
- Composite with 0%, 1%, 2%, 5% and 10%(w/w) graphite with Al6061 was prepared.



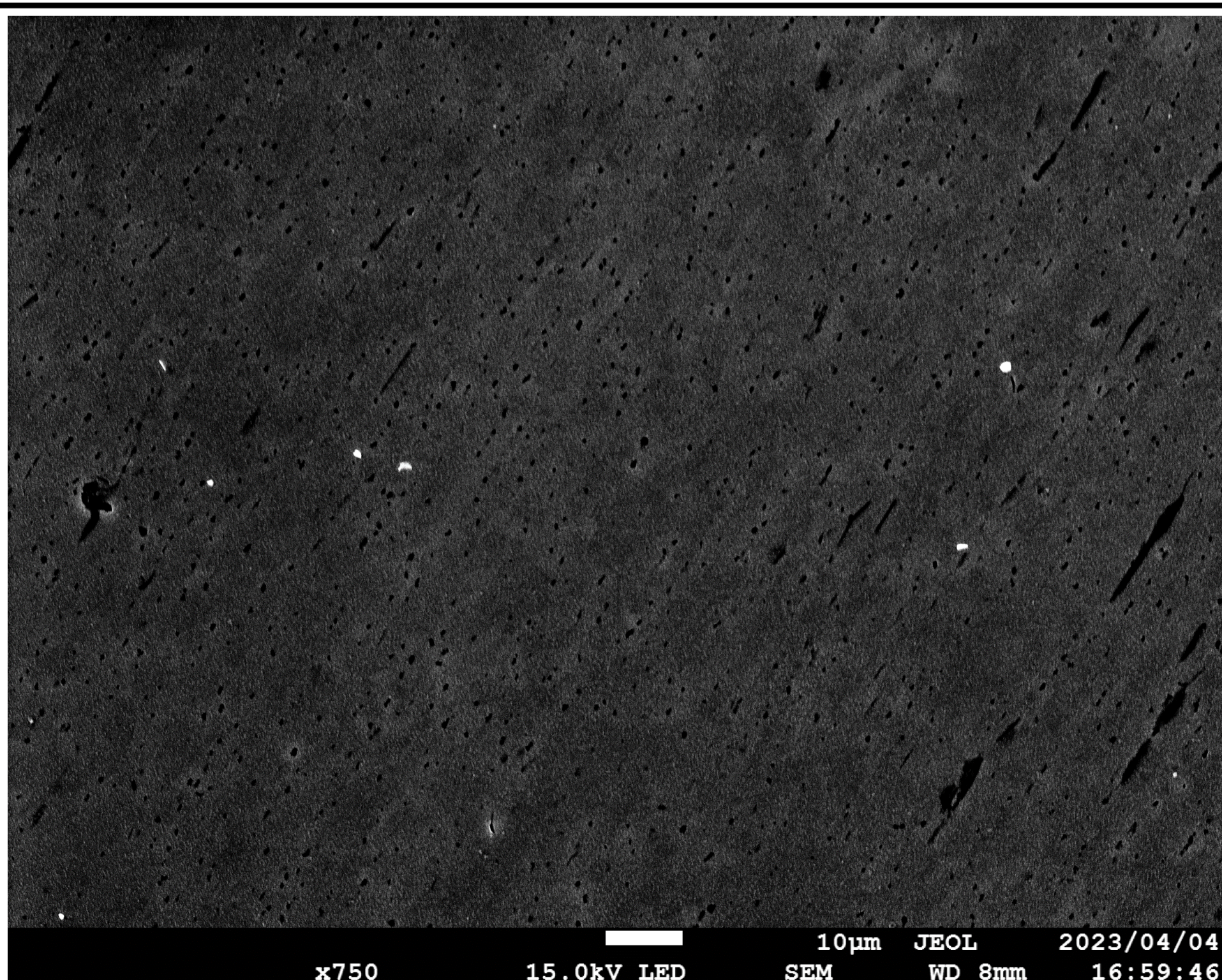
## 3. Cold compaction, Sintering and Extrusion of composite powder



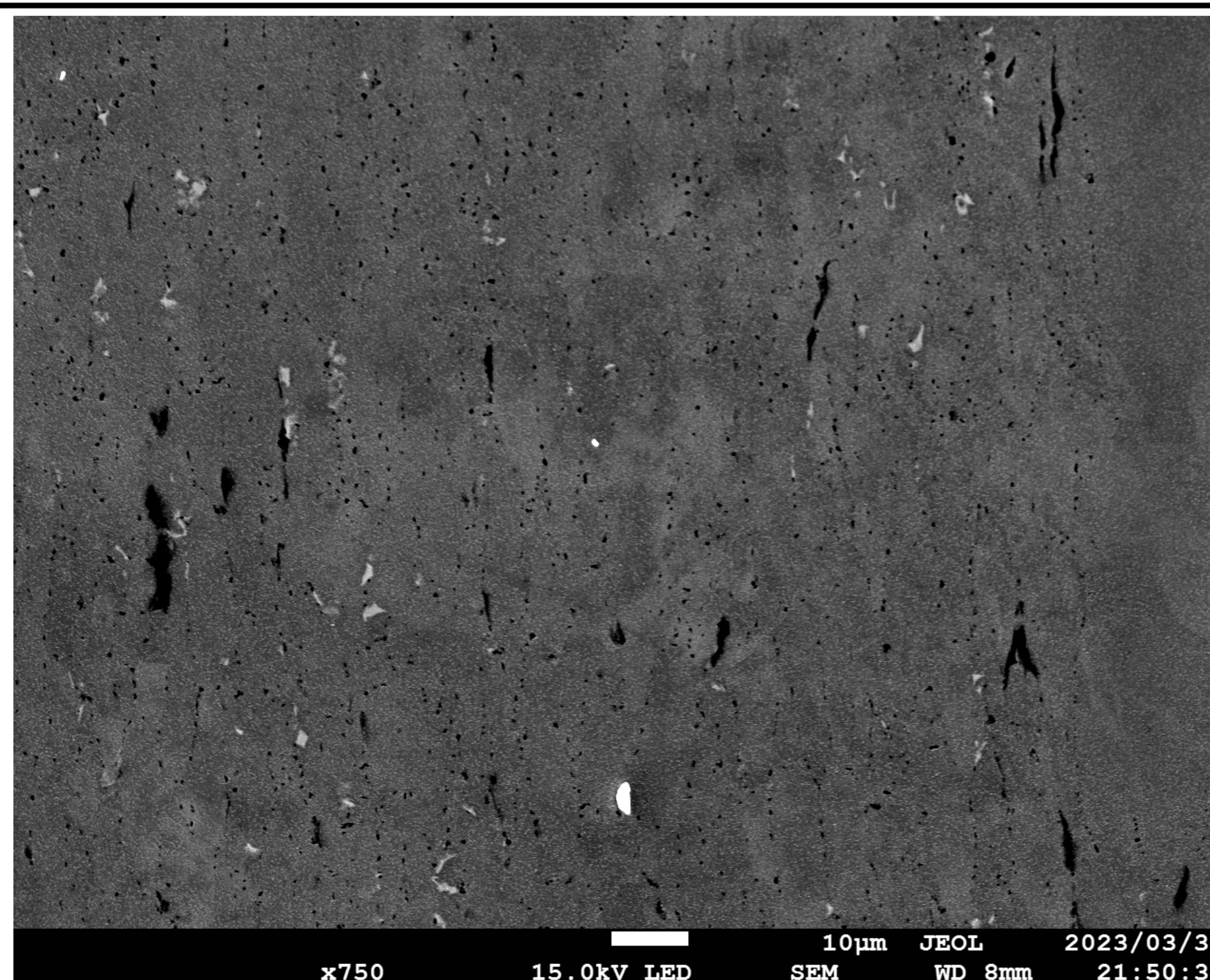
Heating rate	5.25 ° C/sec
Sintering time	Holding at 525 ° C for 3 minutes
Extrusion ratio	4
Ram speed	1 mm/sec
Temperature	525 ° C
Lubricant	Graphite around punch
Die shape	Flat faced die

## 4. Microstructural characterization and Mechanical properties

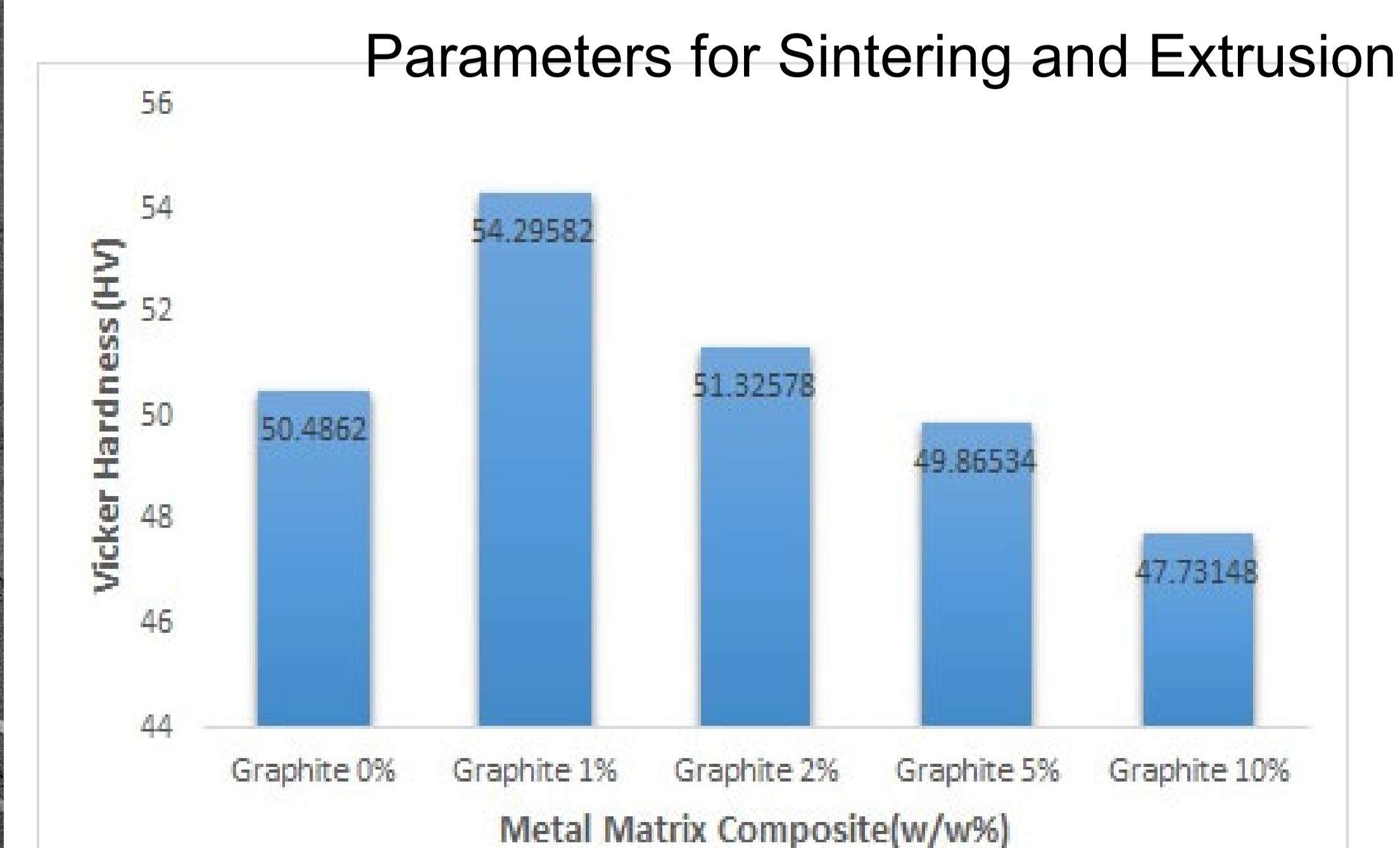
- Uniform dispersion of 1% and 2%(w/w) graphite in aluminium matrix composite confirmed by SEM image.
- Improvement in Vickers Hardness of Al6061 with 1% and 2%(w/w) graphite.



SEM image of 1%(w/w)graphite composite



SEM image of 2%(w/w)graphite composite



Vickers Hardness of graphite aluminium composite