

# ABHISHEK PANDEY

Indian Institute of Technology Mandi, India-175075

+918181096667

[vivekiit.19.mandi@gmail.com](mailto:vivekiit.19.mandi@gmail.com)

---

Date – 29/03/2021

Topic : Applying for P.hd Position

I am writing this letter to express my enthusiasm for this PhD position. The creativity of job has sparked my enthusiasm to apply for this position. Also the amalgamation of my research experience and demand of work will be in favour of enhancing my further research abilities .

Today whole science community is working to find alternate options of sustainable and cheap energy source. Which can be used in mass for whole human community. In continuation of community work, we are also working to increase the measurement temperature range of thermoelectric material measurement setup. This measurement setup was initially automated through LabView software and could measure only upto 620K. Now we have written the dedicated Python code to automate the measurement setup. First task was ensure the communication of Keithley sourcemeter and multimeter. Then using the different channels of both sourcemeter and multimeter we measure the desired parameters. After all this we put the working conditions like giving step size power to heater, defining steady state condition, calculations and plotting of live measurement data, saving these all data in separate file etc.

Major difficulty in this setup is measurement of heat flow through the sample correctly due to undefined quantity of heat loss during the heat flow by conduction ,convection and radiation . Heat loss as conduction from the system increases as temperature increases, so to avoid heat loss we minimise support area of copper blocks using insulation given to lower copper block of the system. Another major challenge was to make heater of very small size approximately  $1\text{cm}^2$  area which can heat sample upto 900K. Task in welding of copper block and thermocouple wire at high temperature which initially used to loose its contact above 650K also solved. For this instead of using commercially available high cost adhesive paste, we use very cheap and fundamental technique.

This setup will help in measurement of seebeck coefficient( $S$ ) and thermal conductivity( $\kappa$ ) from temperature range 300-900K. It works on steady state approach in which we separately calculate values of  $S$ ,  $\sigma$  and  $\kappa$ , then use these values to calculate figure of merit( $ZT$ ).

I am excited to work on the project. Also confident that i am perfect candidate for this exciting work.

Sincerely  
Abhishek Pandey

