Effect of Annealing Treatment on Thermoelectric Properties of Ti-doped ZnO Thin Film

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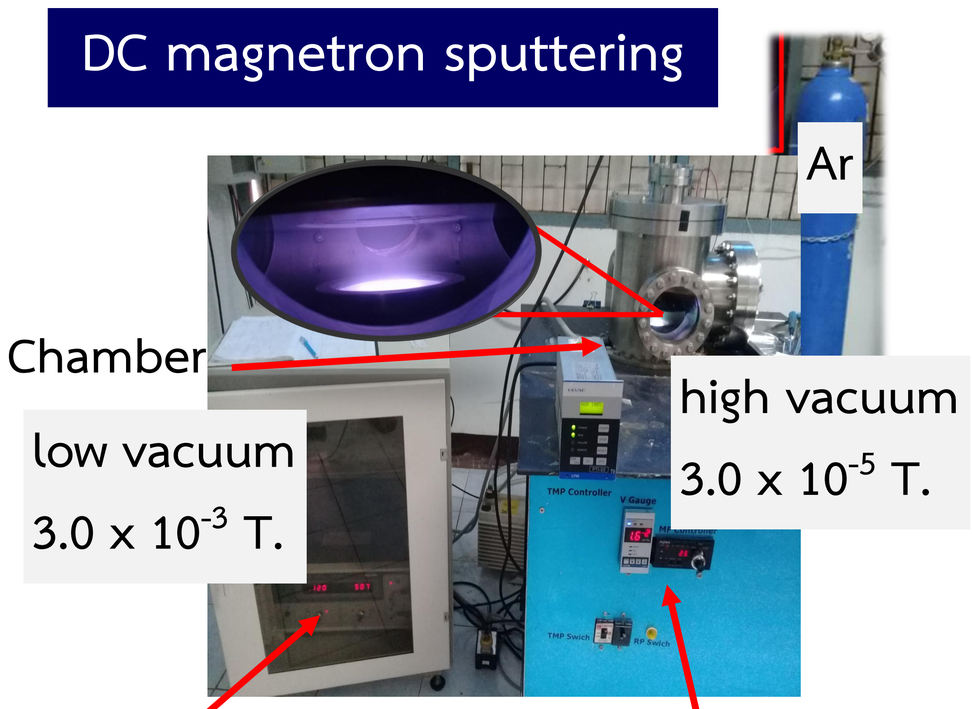
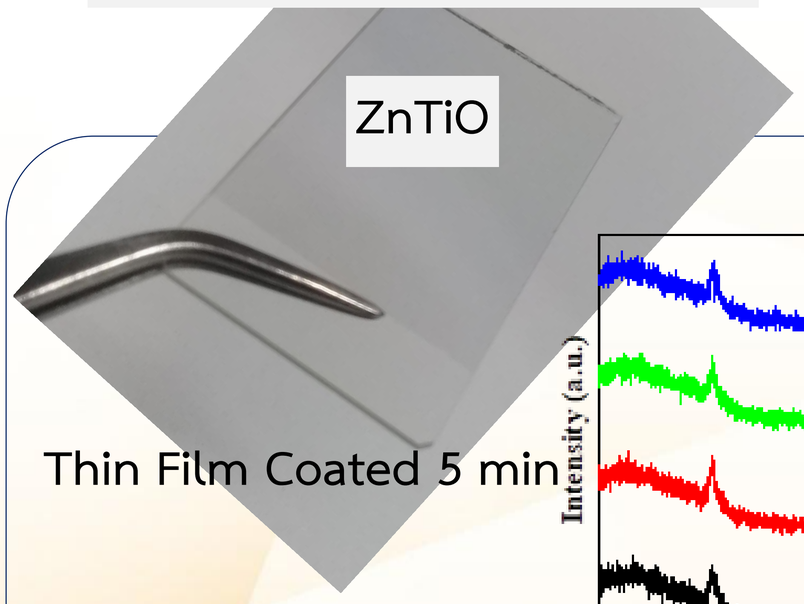
DC magnetron sputtering



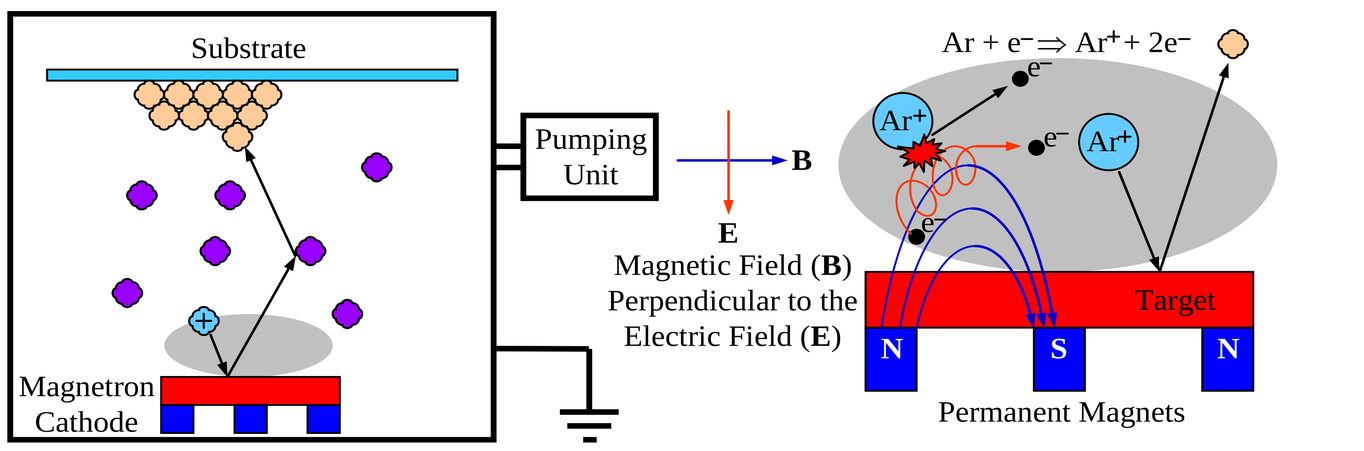
Annealing 373, 473 and 573 K



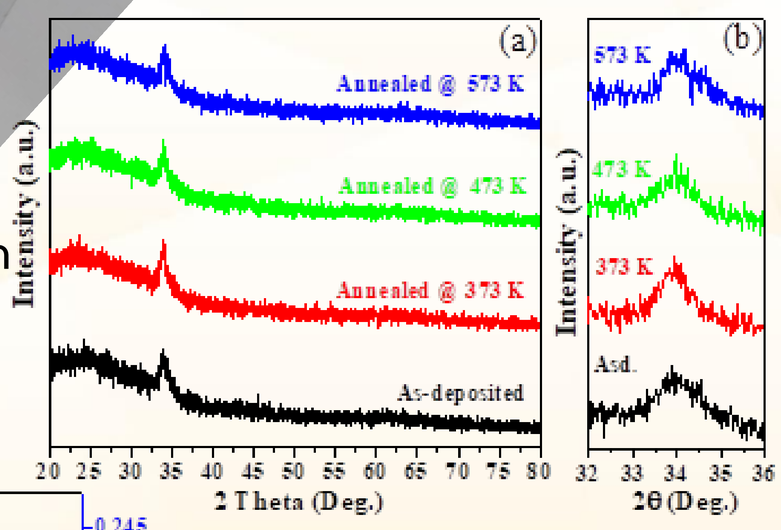
Thin Film Coated 5 min

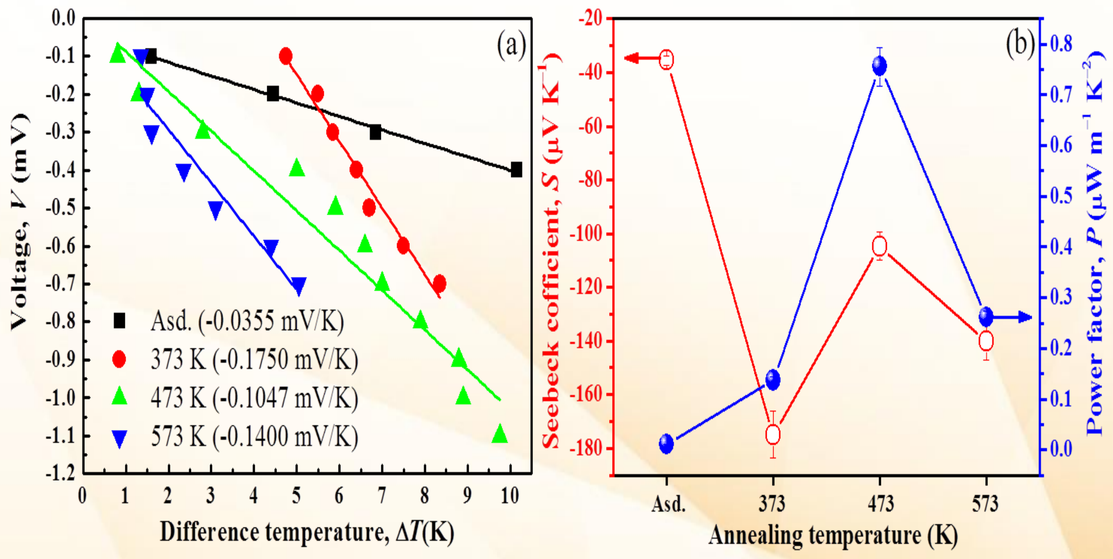
Overview of magnetron sputtering

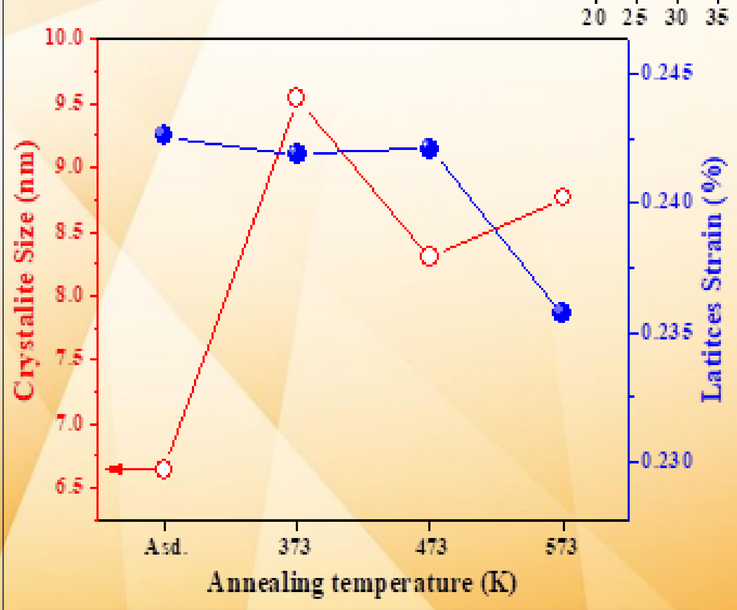
Magnetron sputtering is one of the physical vapor deposition (PVD) processes where ions are accelerated from plasma across a potential drop to bombard the sputtering target. These energetic incident ions cause the ejection of atoms from the target surface. The neutral particles will travel to the substrate which located near the target. They will condense to from a film. The various types of magnetron sputtering technique are direct current (dc), alternating current (ac), radio frequency (rf), and pulsed-dc.

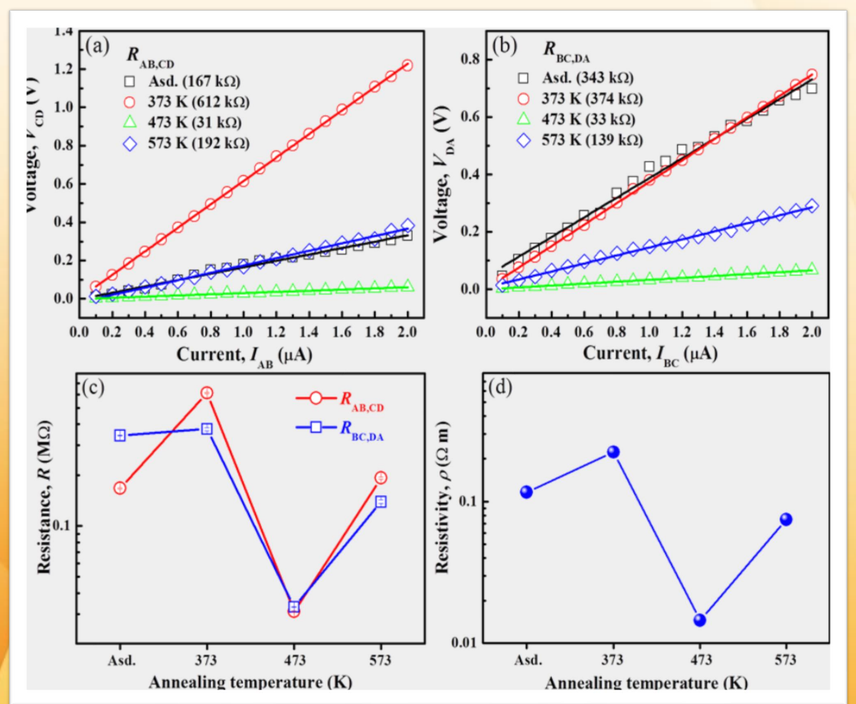


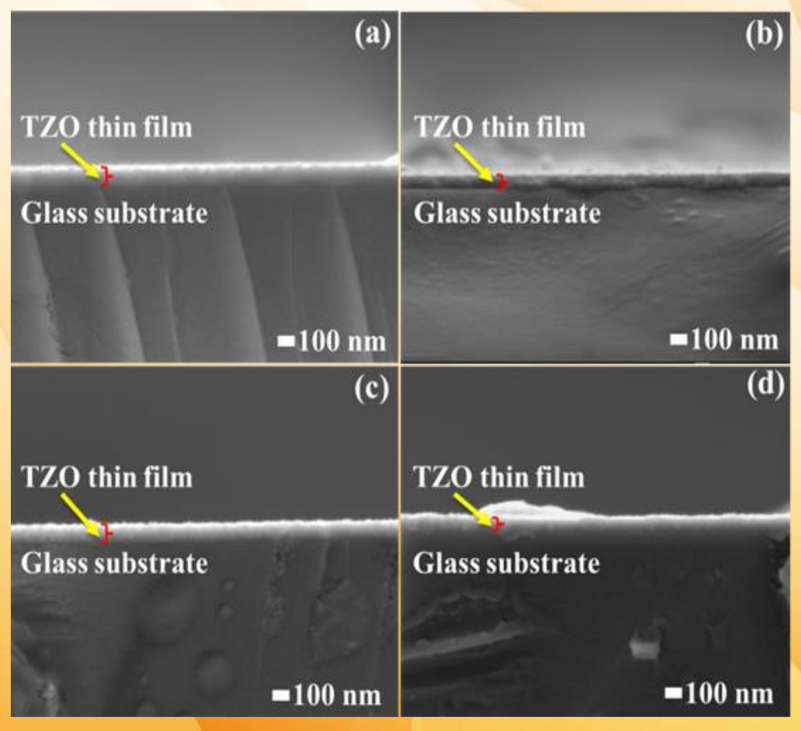
Measurement of thin film properties











Personnel of Unit Thin Film Research

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Conclusion

Ti-doped ZnO thin film could be successfully synthesized onto the glass substrate by a local dc-magnetron sputtering system and low-cost target. All Ti-doped ZnO thin films samples showed hexagonal wurtzite structure with the (002) single peak and the n-type thermoelectricity. At annealed temperature 473 K, Ti-doped ZnO thin film was lowest electrical resistivity, high Seebeck coefficient and maximum power factor approximately $1.45\times10^{-2}\ \Omega$ m, 104.7 μV K^{-1} and 0.76 μW m^{-1} K^{-1} at room temperature, respectively.