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## **Investigation on plasma properties of Er doped TiO<sub>2</sub> thin films deposited by magnetron sputtering**

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The control of the crystallinity, phase composition, microstructure, the growth of smooth and dense films, as well as mechanical and optical properties are of very important for the thin films deposited by magnetron sputtering [1-4].

In this work, Er-doped TiO<sub>2</sub> thin films have been prepared by 13.56 MHz and 60 MHz dual-frequency magnetron co-sputtering technology. The plasma properties of Er doped TiO<sub>2</sub> thin films deposited by magnetron co-sputtering were studied by using the optical emission spectroscopy and the retarding field energy analyzer. It is found that the obtained Er-doped TiO<sub>2</sub> thin films show a lower sputtering deposition rate and a higher Ra.

In addition, the plasma property of 60 MHz VHF magnetron sputtering discharge is also studied. To enhance the plasma density while keeping the higher ion energy, the ICP assisted VHF sputtering discharge is developed and the plasma property of ICP-assisted VHF magnetron sputtering is also analyzed. The results show

that ICP-assisted discharge did not affect the feature of ion energy distribution obviously while with proper increase of ion flux and electron density. It is expected to be used in the depositions of thin films with high deposition rate and good crystal structure.

**Key words:** plasma properties; Er doped TiO<sub>2</sub> thin films; magnetron sputtering; ICP-assisted discharge

### References

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