

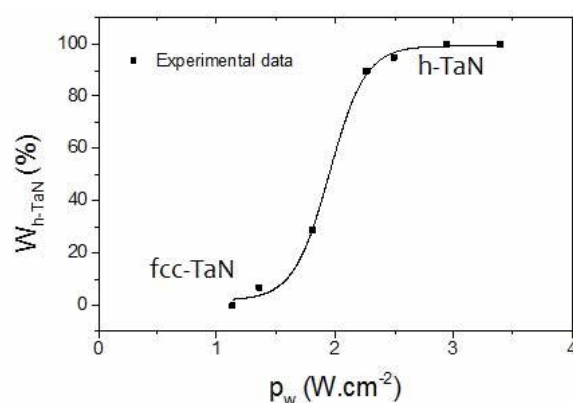
## Tantalum nitride structure selection and carbon diffusion

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Because of their unique electrical, mechanical and chemical properties, transition metal nitride thin films have attracted considerable attention in recent years. In particular, tantalum nitride (TaN) thin films are very promising materials due to their high thermal stability, hardness, chemical inertness and conductivity. TaN exhibits two crystallographic structures: Hexagonal and cubic. An accurate control of reactive magnetron sputtering deposition conditions allows us to isolate both phases. TaN thin films can be used as buffer layers and diffusion barriers against cobalt diffusion during diamond deposition on sintered WC-Co cutting tools. Its function is also supposed to control carbon diffusion phenomenon during the process in order to enhance diamond nucleation. In this study, we gauge the potentiality of the metastable face-centered-cubic and the stable hexagonal TaN phases on diamond nucleation. The potentiality of TaN to be carburized during the CVD diamond deposit process is discussed as the carbon diffusion phenomenon. The understanding of the specific responses of each TaN phase during the CVD process opens up new horizons for diamond coating performances.



**Figure 1:** Evolution of the hexagonal TaN weight ratio as a function of target power density (reactive magnetron sputtering).

## Biography

A Poulon Quintin is an Associate Professor at the University of Bordeaux and Institut de Chimie de la Matière Condensée de Bordeaux. She has a long experience in the correlation between process parameters, microstructure and properties of structural and functional materials. Her current interests range from the search for innovative multifunctional coatings, more exactly hard coatings, for applications in energy, aerospace and aeronautical industries. She is a specialist in fine characterization with an extended recognized experience in electronic microscopy and physico-chemical techniques.

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