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Nanoparticulate film deposition via reactive atmospheric pressure plasma

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In recent years, non-thermal reactive atmospheric pressure plasma has attracted a lot of research attention for film deposition in a continuous way. The plasma is composed of charged particles and excited neutrals with high reactive energy. It can provide a unique environment for chemical reactions and film growth, which is distinct from the ordinary condensed chemical reaction driven by a single hot source. All the reactions are far from chemical equilibrium and take place at low gas temperature. It shows great potential industry applications in temperature-sensitive substrates. Inorganic, organic/inorganic hybrid, polymeric nanoparticulate films such as TiO₂, SiCxOyHz and fluorocarbon polymers have been deposited on different substrates through kHz or RF reactive atmospheric pressure plasma discharge. The film structure and morhoplogies have been analyzed through FE-SEM, ATR-FTIR, XRD and TEM. The atmophseric pressure stable dishcarge and deposition processes have also been investigated by OES or I-V characteristics, etc. Some applications of the films in new energy or surface modifications are also discussed.

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