

Development of highly fluorinated high k dielectric hybrid material solution for the application of flexible electronic devices

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Abstract

Solution processing is a device fabrication method, in which solutions of electronic materials are deposited by a variety of printing technique. This protocol in conjunction with organic electronic materials is believed the most promising candidate for realizing affordable, large-area, flexible electronic devices. So far, for solution processing of insulating layers in those devices, polymer coatings from organic solutions have been used although their dielectric constants are usually low ($k=2-4$). Apart from the electrical properties, chemical compatibility issues should also be considered particularly when those polymer solutions are cast on top of active organic semiconductor materials during the construction of multi-layered devices.

These technical issues led us to develop new solution-processable insulating materials which have both high dielectric constants and immiscibility with ordinary organic layers. Our strategy is to mix inorganic nanocrystals, including HfO_2 and ZrO_2 , with highly fluorinated polymers using fluoruous solvents. In this presentation, we show our nanocrystal synthesis, ligand exchange processes with fluorinated functional materials, film-casting from fluoruous solutions, and finally brief mention on the electrical behavior of those inorganic nanocrystal thin films.

References

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Figures

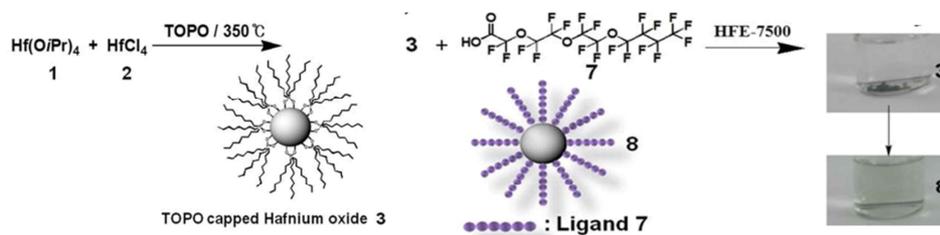


Figure 1. Synthesis of tri-n-octylphosphine oxide capped Hafnium oxide and ligand exchange scheme and digital image of highly fluorinated hafnium