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Oxime-modified aluminium(III) alkoxides : Potential precursors for alumina nano-powders and optically transparent alumina film

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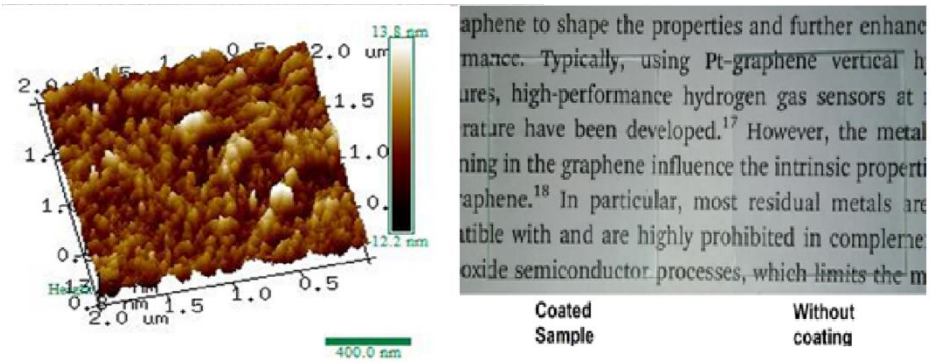
Graphical abstarct



Highlights

Alumina precursors of the type, $[Al(O^iPr)_{3-n}\{ONC(CH_3)_2\}_n]$, where n = 1, 2 or 3 were synthesized using aluminium(III) *iso*-propoxide and acetoxime. Soft transformation of these complexes to alumina nano-powders was carried out by the sol-gel process. Optically transparent crack free alumina film was deposited on the glass substrate using alumina sol, prepared by the complex, $[Al(O^iPr)\{ONC(CH_3)_2\}_2]$ through dip coating method. The alumina film is found to be ~95% optically transparent in the visible region.

Abstract

Reactions of aluminium(III) *iso*-propoxide (**A**) with acetoxime in anhydrous benzene yielded complexes of the type $[Al(O^iPr)_{3-n}\{ONC(CH_3)_2\}_n]$, where n = 1 (**1**), 2 (**2**) & 3 (**3**). These complexes were characterized by elemental analysis, FTIR and NMR (^1H, ^{13}C, ^{27}Al) spectral studies. Spectral studies of (**1**-**3**) suggest the presence of bi-dentate mode of the oximato moieties in the solution state. Soft transformations of aluminium(III) *iso*-propoxide (**A**) and their oxime derivatives (**1**-**3)** to pure alumina (**a**-**d)** were carried out by the sol-gel technique. The powder XRD patterns of all the formed