Electronic Supplementary Information (ESI) for

Ru cyclooctatetraene precursors for MOCVD

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**Fig. S1** IR spectrum of 2 as a KBr disk.
Fig. S2 IR spectrum of 3 as a KBr disk.
Fig. S3 $^1$H NMR spectrum of 2 in CDCl$_3$. 
Fig. S4 $^1$H NMR spectrum of 3 in CDCl$_3$. †: Impurity, 1.
**Fig. S5** TG-DTA analysis of 1 (flow gas: N$_2$, flow rate: 100 mL min$^{-1}$, heating rate: 5 °C min$^{-1}$).
Fig. S6 TG-DTA analysis of 2 (flow gas: N$_2$, flow rate: 100 mL min$^{-1}$, heating rate: 5 °C min$^{-1}$).
**Fig. S7** TG-DTA analysis of 3 (flow gas: N₂, flow rate: 100 mL min⁻¹, heating rate: 5 °C min⁻¹).
**Fig. S8** A SEM image of a Ru film deposited from 1 at 165 °C under a flow of N₂ (10 sccm) and H₂ (1 sccm).
Fig. S9 A SEM image of a Ru film deposited from 3 at 165 °C under a flow of N₂ (10 sccm) and H₂ (1 sccm).
**Fig. S10** An AFM image of a 17 nm thick Ru film deposited from 1 at 165 °C under a flow of N₂ (10 sccm) and H₂ (1 sccm). (a) Two- and (b) three-dimensional views.
Fig. S11 An AFM image of a 49 nm thick Ru film deposited from 3 at 175 °C under a flow of N₂ (10 sccm) and H₂ (1 sccm). (a) Two- and (b) three-dimensional views.
Fig. S12 (a) An XRD pattern of Ru film deposited from 2 at 165 °C on SiO₂ substrates under a flow of N₂ (10 sccm) and H₂ (1 sccm). (b) Magnification of Ru(100), Ru(002) and Ru(101) peaks in (a).
Fig. S13 (a) An XPS spectrum of a Ru film deposited from 1 at 165 °C under a flow of N₂ (10 sccm) and H₂ (1 sccm). Peaks for O 1s and Si 2p originate from a SiO₂ substrate. (b) Magnification of Ru 3d₃/₂ and 3d₅/₂ peaks in (a).
Fig. S14 (a) An XPS spectrum of a Ru film deposited from 3 at 175 °C under a flow of N₂ (10 sccm) and H₂ (1 sccm). Peaks for O 1s and Si 2p originate from a SiO₂ substrate. (b) Magnification of Ru 3d₃/₂ and 3d₅/₂ peaks in (a).
**Fig. S15** (a) A SEM image of holes with aspect ratios 40:1. A Ru film was deposited at 155 °C under a flow of N₂ (10 sccm) and H₂ (1 sccm) from complex 1. Magnified images of (b) top, (c) middle and (d) bottom of the hole.
**Fig. S16** (a) A SEM image of holes with aspect ratios 40:1. A Ru film was deposited at 165 °C under a flow of N₂ (10 sccm) and H₂ (1 sccm) from complex 3. Magnified images of (b) top, (c) middle and (d) bottom of the hole.