Supporting Information

Synthesis of Pyrite Thin Films and Transition Metal Doped Pyrite Thin Films by Aerosol-Assisted Chemical Vapour Deposition from Single-Source Precursors

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Figure S1. EDX spectra of pyrite (FeS$_2$) thin films deposited from complex [Fe(S$_2$CNEt$_2$)$_3$] (1) on glass substrate by AACVD at 350 °C.
Figure S2. EDX spectra of cobalt doped pyrite (Co$_x$Fe$_{1-x}$S$_2$) thin films deposited from complexes [Fe(S$_2$CNEt$_2$)$_3$] (1) and [Co(S$_2$CNEt$_2$)$_3$] (2) on glass substrate by AACVD at 350 °C.

Figure S3. EDX spectrum of nickel doped pyrite (Ni$_x$Fe$_{1-x}$S$_2$) thin films deposited from complexes [Fe(S$_2$CNEt$_2$)$_3$] (1) and [Ni(S$_2$CNEt$_2$)$_2$] (3) on glass substrate by AACVD at 350 °C.
Figure S4. EDX spectra of copper doped pyrite ($\text{Cu}_x\text{Fe}_{1-x}\text{S}_2$) thin films deposited from complexes $[\text{Fe}($$\text{S}_2\text{CNEt}_2$$)_3]$ (1) and $[\text{Cu}($$\text{S}_2\text{CNEt}_2$$)_2]$ (4) on glass substrate by AACVD at 350°C.

Figure S5. EDX spectra of zinc doped pyrite ($\text{Zn}_x\text{Fe}_{1-x}\text{S}_2$) thin films deposited from complex $[\text{Fe}($$\text{S}_2\text{CNEt}_2$$)_3]$ (1) $[\text{Zn}($$\text{S}_2\text{CNEt}_2$$)_2]$ (5) on glass substrate by AACVD at 350 °C.
Figure S6. TGA/DSC curve of complex [Fe(S$_2$CNEt$_2$)$_3$] (1).

Figure S7. TGA/DSC curve of complex [Co(S$_2$CNEt$_2$)$_3$] (2).
Figure S8. TGA/DSC curve of complex [Ni(S₂CNET₂)₂] (3).

Figure S9. TGA/DSC curve of complex [Cu(S₂CNET₂)₂] (4).
Figure S10. TGA/DSC curve of complex [Zn(S₂CNEt₂)₂] (5).

FTIR
The IR spectra of dithiocarbamate complexes consist of three basic regions; the first region extends from 1450 to 1550 cm⁻¹ and account for the thioureide (NCSS) band whose position typically lies in between C-N and C=N band. The position of this sharp and strong band is indicative of an important mark of double bond character shown by a number of resonating states. The absorption band at 1500 cm⁻¹ is attributed as arising from polar structure —NCS₂. The second region (1070-930 cm⁻¹) is descriptive of coordination mode of dithiocarbamate moiety (CSS). The third region around 350-400 cm⁻¹ is attributed to M-S bonds.

Figure S11. FTIR spectra of transition metals complexes[Fe(S₂CNEt₂)₃] (1), [Co(S₂CNEt₂)₃] (2), [Ni(S₂CNEt₂)₂] (3), [Cu(S₂CNEt₂)₂] (4) and [Zn(S₂CNEt₂)₂] (5).