Supporting Information

Photocatalytic reduction of carbon dioxide to methanol using ruthenium trinuclear polyazine complex immobilized to graphene oxide under visible light irradiation

Pawan Kumar\textsuperscript{a}, Bir Sain\textsuperscript{a} and Suman L. Jain\textsuperscript{a}\textsuperscript{*}

\textsuperscript{a}Chemical Sciences Division
CSIR-Indian Institute of Petroleum, Dehradun-248005 (India)

\textsuperscript{*Email: Suman@iip.res.in}

Fig. S1: N\textsubscript{2} adsorption desorption isotherm of (a) GO and (b) GO-Ru complex
Fig. S2: Pore size distribution of a) GO and b) GO attached complex 2
Fig. S3. $^1$H-NMR of Ruthenium trinuclear complex $\text{I}$ in DMSO-$d_6$
Fig. S4: $^{13}$C-NMR ruthenium complex\textbf{I} in DMSO-d$_6$
Fig. S5: ESI-Mass spectra of ruthenium trinuclear complex 1
Supporting Fig. S6: ESI-Mass spectra of ruthenium trinuclear complex 1 Expanded form
**Fig. S7:** Calibration curve for methanol quantification
Fig. S8: GC chromatogram of the reaction product after 48 h of photoreduction of CO$_2$
Fig. S9: GC-MS spectra of methanol produced by photocatalytic reduction of $^{12}\text{CO}_2$ or $^{13}\text{CO}_2$: a) GC-MS chromatogram at m/z 32 under $^{12}\text{CO}_2$; b) GC-MS chromatogram at m/z 33 under $^{13}\text{CO}_2$. 

---

![GC-MS spectra](image)