Single atom alloy catalyst for SO₃ decomposition: Enhancement of platinum catalyst’s performance by Ag atom embedding
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**Supporting Information**

Figure-S1: Low lying isomer of SO₃(Pt₁₀@Al₂O₃) complex. ΔE indicates relative stability.
Figure-S2: Electronic density of states of pristine SO$_3$ molecule. Molecular Orbital pictures has been obtained via all electron calculations at B3LYP/6-311+g(d, p) level of theory.

Figure-S3: Low lying isomer of gas phase AgPt$_9$ cluster. $\Delta E$ indicates relative stability.
Figure-S4: Low lying isomer of AgPt\textsubscript{9}@Al\textsubscript{2}O\textsubscript{3} cluster. $\Delta E$ indicates relative stability.
Figure-S5: Comparative DOS spectrum of (a) Pt$_{10}$@Al$_2$O$_3$ and (b) AgPt$_6$@Al$_2$O$_3$. 

- **Pt$_{10}$@Al$_2$O$_3$**
  - d-band centre: -2.36 eV

- **AgPt$_6$@Al$_2$O$_3$**
  - d-band centre: -2.27 eV
Figure-S6: Low lying isomer of SO$_3$-(AgPt$_9$@Al$_2$O$_3$) complex. $\Delta E$ indicates relative stability.
Figure-S7: Single Ag atom substituted Pt(111) surface. The substitution at 2\textsuperscript{nd} and 3\textsuperscript{rd} layer is found to be 0.25 and 0.26 eV higher in energy.
**Figure-S8**: Low lying isomer of SO$_3$ on Pt(111) and Ag$_x$Pt(111) surface. $\Delta E$ indicates relative stability.