**Supplementary materials**

![Graph](Figure_S1.png)

**Figure S1.** H₂ production rate using oxalic acid as sacrificial agent and selected P25-Au-based composites as photocatalysts.

![Graph](Figure_S2.png)

**Figure S2.** Degradation curves for phenol (a) and oxalic acid (b) of the prepared nanocomposites under Vis irradiation (PhLy refers to the degradation without photocatalyst).