

Unlocking the Potential of Carbon Incorporated Silver-Silver Molybdate Nanowire with Light

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We present a novel form of Ag_2MoO_4 -based hybrid nanowire (NW) with a few remarkable attributes. Firstly, the NW is embedded and decorated with Ag NPs. Secondly, carbon atoms are intentionally incorporated within the matrix of the NW. Thirdly the hybrid nanowires are created *via* a facile process. Namely, focused laser micropatterning of Ag NPs on GO film as seeding sites and subsequent formation of the hybrid NWs by placing the patterned GO films on heated Mo foil on a hotplate. This unique process resulted in the production of hybrid $\text{Ag}/\text{Ag}_2\text{MoO}_4$ NWs that emit unique red fluorescence emission. And finally remarkable photodoping effect is observed from a single strand of optically tuned carbon-doped silver nanoparticles embedded silver molybdate nanowire. We demonstrate applications of these hybrid NWs as micro-display and time limiting, logic components for secure transmission of messages.

REFERENCES

[1] S. X. Lim, Z. Zhang, G. K. W. Koon, C. H. Sow, *Applied Materials Today*, 20 (2020) 100670

FIGURE

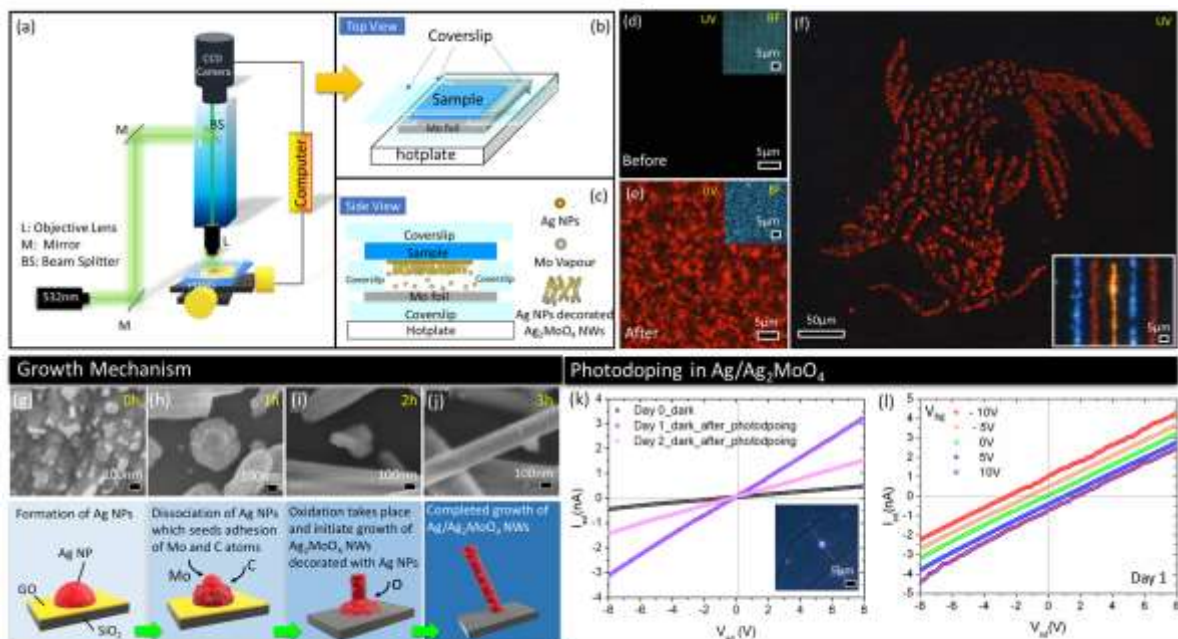


Figure 1: Schematic of the (a) FLB setup, (b) top- and (c) side-view of how the sample and metal source are arranged during the heating process. (d-e) FM of the samples (d) before and (e) after growth of $\text{Ag}/\text{Ag}_2\text{MoO}_4$ NWs under UV excitation. Inset are the corresponding BF images. (f) FLB patterned micro-art of a *Cyprinus carpio*. Inset of (f) shows a multi-colour display obtained using different materials. SEM images of Ag NPs patterned GO samples taken at (g) 0h, (h) 1h, (i) 2h and (j) 3h of growth in the presence of Mo foil. Below the SEM images are models illustrating the growth process. (k) I_{sd} - V_{sd} of single $\text{Ag}/\text{Ag}_2\text{MoO}_4$ NW before (Day0), one day (Day1) and two days (Day2) after photodoping with 325 nm focused laser beam. (l) I_{sd} - V_{sd} of Day 1 sample with back gate, V_{bg} .