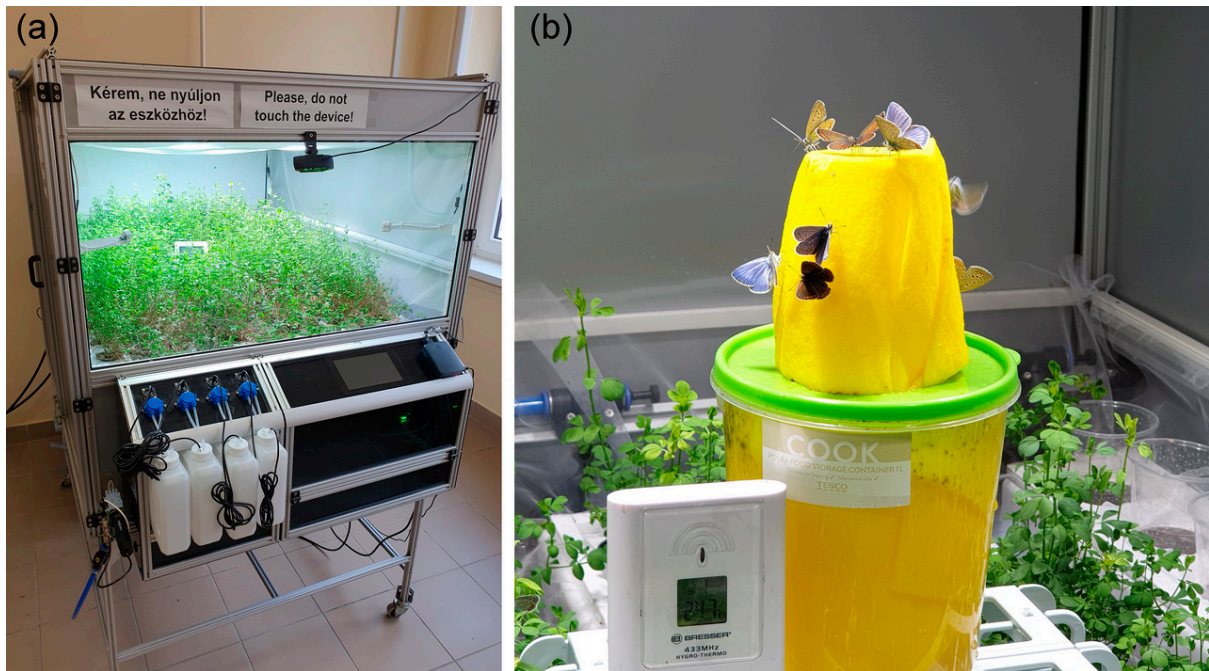
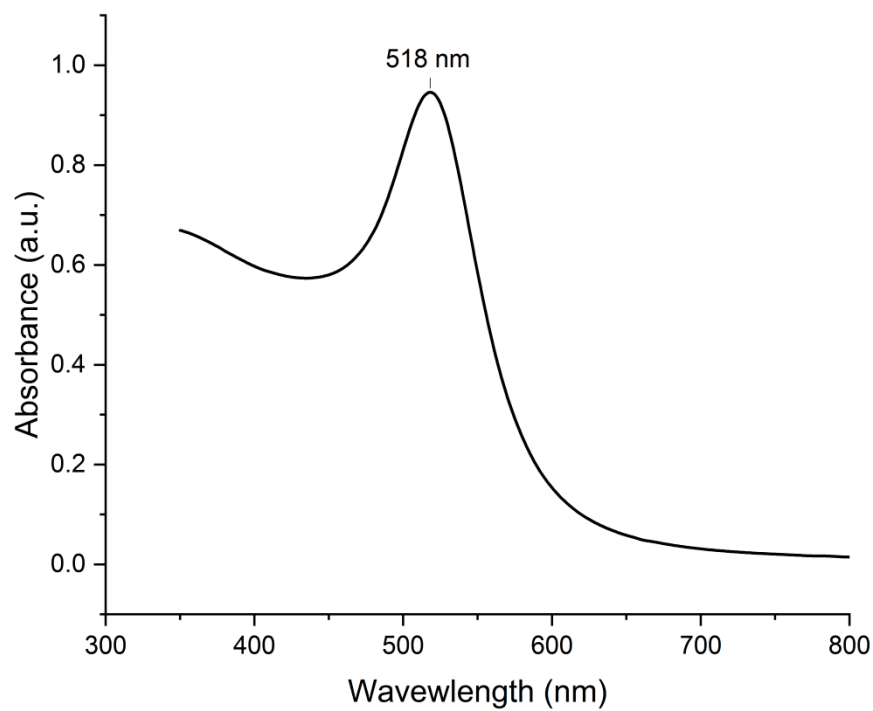


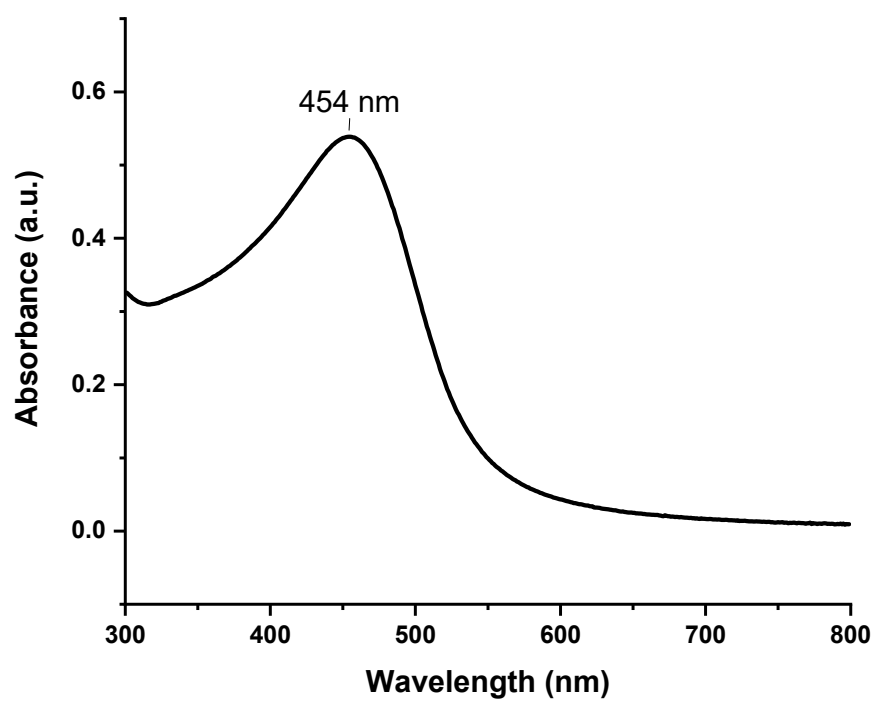
## Supplementary Info



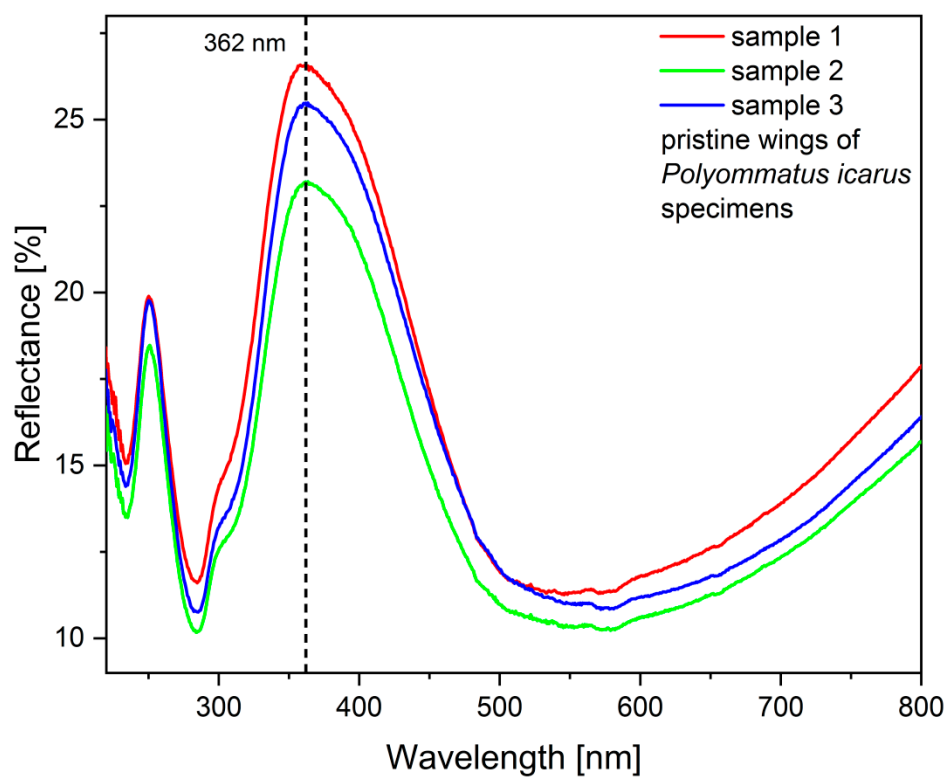
**Figure. S1.** In a custom-made apparatus (a) with feeding *Polyommatus icarus* specimens (b) in which the vegetation and the climate of the habitat needed by the butterflies can be replicated, it is possible to breed butterflies all year, continuously, regardless the outdoor weather conditions.



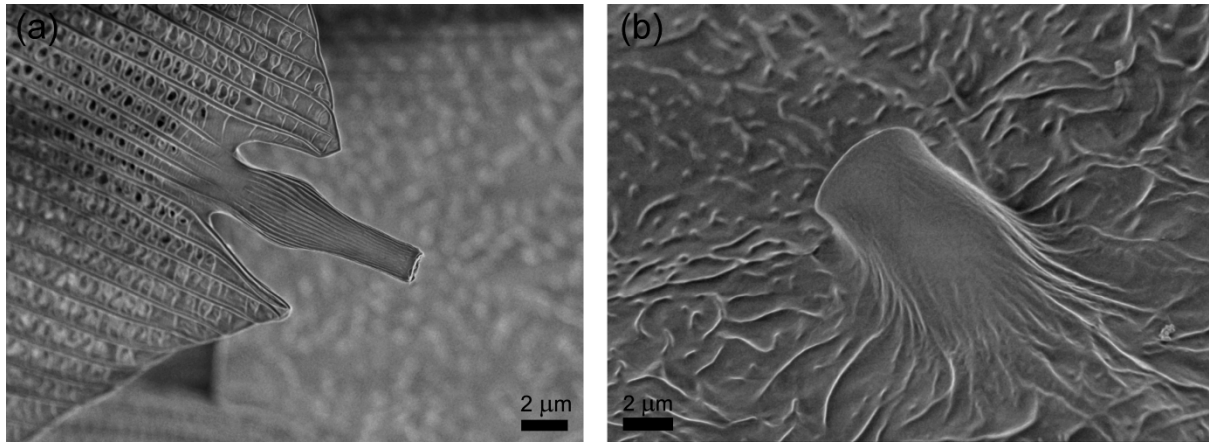
**Figure. S2.** Absorbance of the Au nanoparticles in sodium citrate solution.



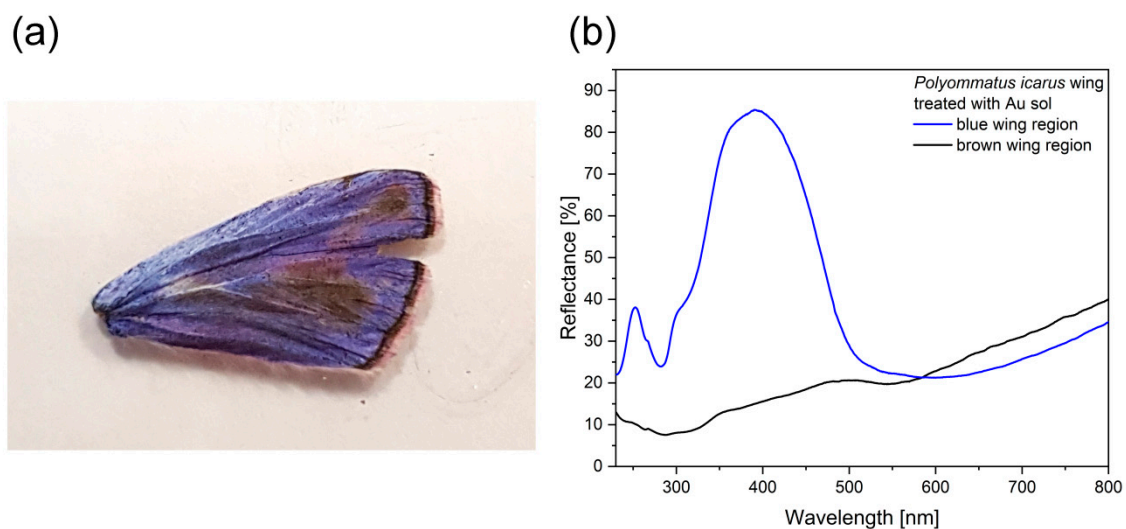
**Figure. S3.** Absorbance of the Ag/Au nanoparticles in sodium citrate solution.



**Figure. S4.** Reflectance spectra measured with an integrating sphere of the pristine wings on which later different amounts of Au sols were applied in Figure 4.



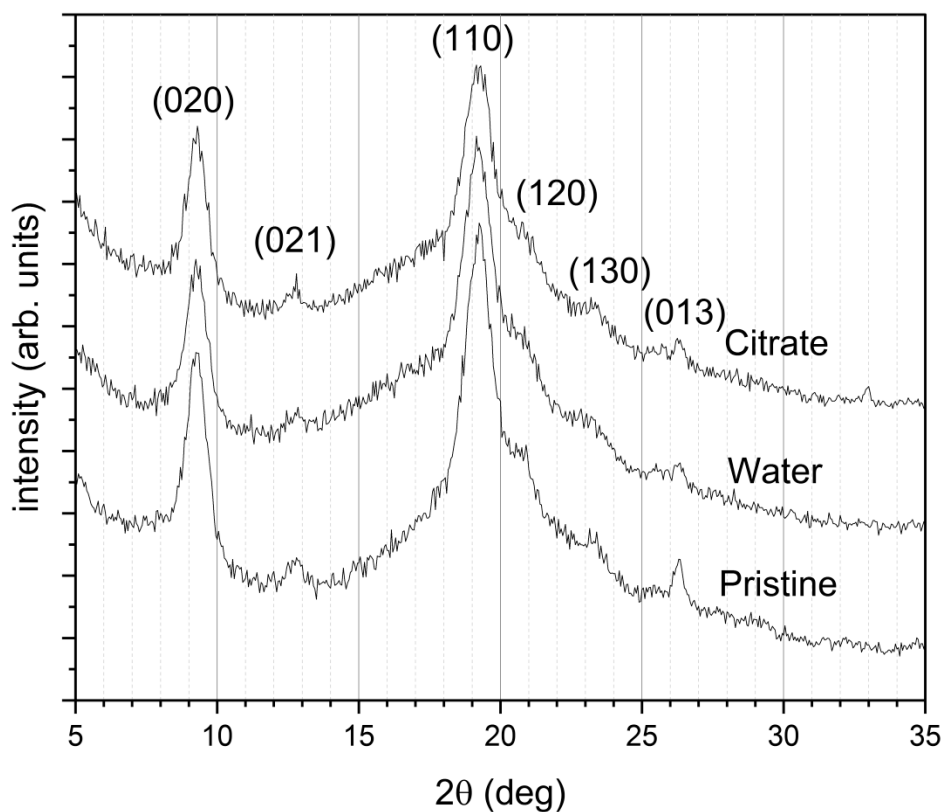
**Figure. S5.** SEM images of (a) a pedicel of a cover scale and (b) a socket which connects it to the wing membrane.



**Figure. S6.** *Polyommatus icarus* wing treated with Au sol. (a) Brown region can be observed where the coalescence of the Au nanoparticle occurred. (b) Normal incidence reflectance of the blue region of the wing and of the brown region of the same wing, where the coalescence occurred.

### XRD experimental method

X-ray diffractometry (XRD) measurements were performed in parallel geometry using a D8 Discover diffractometer (Bruker AXS, Karlsruhe, Germany) equipped with Göbel-mirror and a scintillation detector with Cu K $\alpha$  radiation. The X-ray beam dimensions were 1 mm  $\times$  5 mm, the  $2\theta$  step size was 0.05°, scan speed 30 sec/step.



**Figure. S7.** X-ray diffractograms of the chitin is as-received state (Pristine); after 6 hours continuous stirring in deionized water (Water); and in sodium citrate solution (Citrate). One cannot observe any significant alteration in the XRD plots.