



Figure S1 Evaluating our *in cellulo* mammalian cell culture system. **a**, Determination of number of UASs in the artificial promoter to regulate the output reporter gene. We first constructed reporter vectors, varying the number of UAS (from 1 through 5) on the promoter driving a reporter gene (*dLuc*). We transfected them with a morning activator and a night-time repressor into NIH3T3 cells and then monitored the bioluminescence from the cells. The raw bioluminescence data from two independent samples are shown. The relative amplitudes of each output signal from two independent samples are also shown (**lower left panel**). **b**, Determination of number of CCEs in the artificial promoter to regulate the activator and repressor genes. We first constructed two sets of vectors with two and three copies of the clock-controlled elements (CCE; E'-box from the *Per2* gene, or RRE from the *Bmal1* gene) on promoters driving a reporter gene (*dLuc*), an artificial activator gene (*dGal4-VP16*) or an artificial repressor gene (*dGal4*). We then monitored their promoter activities (either 2x or 3x E'-box, and either 2x or 3x RRE) as well as the output

(UAS) from artificial transcriptional circuits with a morning activator and a night-time repressor. The raw bioluminescence data from two independent samples are shown. The relative amplitudes of each output signal from two independent samples are also shown (**lower left panel**). **c**, Negative controls for quantification of GAL4-VP16-FLAG and GAL4-FLAG bindings to the UAS in the artificial transcriptional circuits. After normalization for the amount of input DNA, the amount of *Tbp-5'* region immunoprecipitated by anti-FLAG antibody (squares) and by anti-V5 antibody (triangles) were quantified relative to a constitutively unbound region (*Act-5'*). These relative amounts of *Tbp-5'* ChIP products are indicated along with the LUC activity (line) for two different artificial transcriptional circuits using dGAL4-VP16-FLAG (green) and dGAL4-FLAG (magenta). ChIP assays were performed with the artificial transcriptional circuit (morning activator and night-time repressor) in NIH3T3 cells at 4-h intervals for 24 h with anti-FLAG antibody and anti-V5 antibody as negative control.

