Light teaches (co)enzymes new tricks

**Scientific Achievement**
A suite of flavin-dependent enzymes were shown to catalyze the radical-based production of nitrogen-containing cyclic molecules when exposed to light.

**Significance and Impact**
Using enzymes for the photocatalysis of radical reactions opens the door to creating small molecule drugs that cannot be synthesized with traditional chemical approaches.

**Research Details**

– For one enzyme, GluER, mutation of a residue on the surface of the protein (GluER-T36A) showed a dramatic increase in product yield.

– X-ray crystal structures of GluER and mutated GluER-T36A from NSLS-II beamlines AMX and FMX showed no differences in structure that explain the increased yield by the mutant.

– Rather, the mutation was shown to decreases the protein’s thermal stability, likely altering its dynamics.

Superimposed x-ray crystal structures of GluER-T36A (blue) and GluER (orange) with the T36A mutation highlighted in red. Despite having a structure indistinguishable from wild-type GluER, GluER-T36A provides a higher product yield.


Work was performed in part at Brookhaven National Laboratory