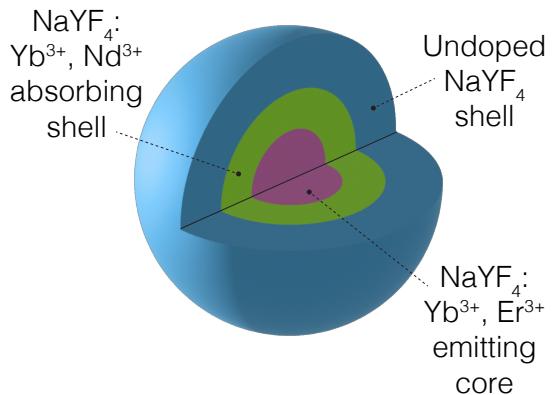
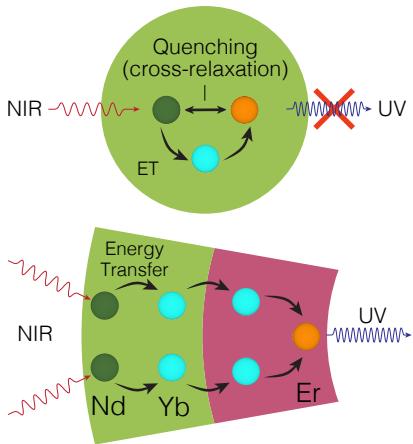
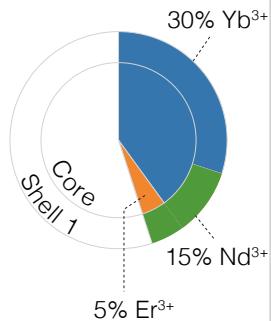
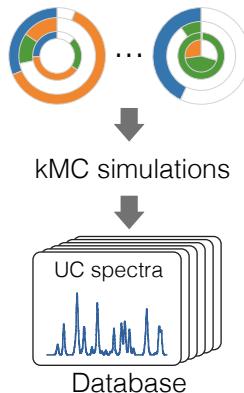
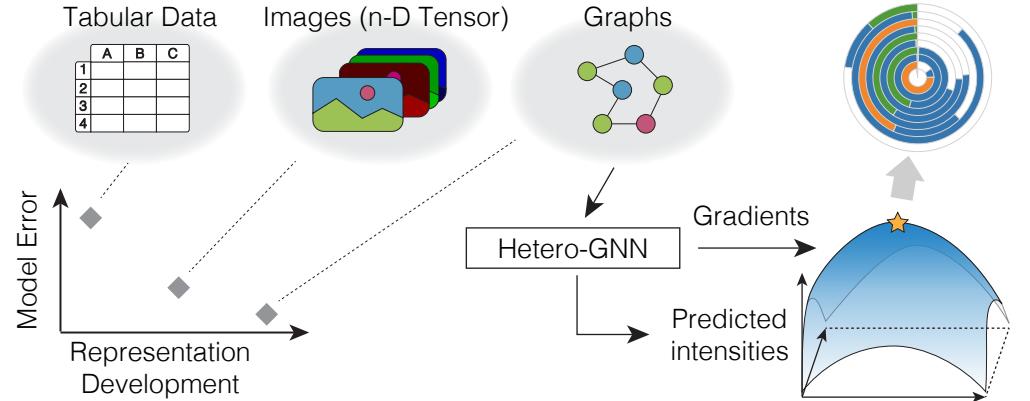


**a** Upconverting nanoparticle (UCNP)**b** Heterostructure dictates photophysics**c** Domain compositions**d** Dataset Construction**e**

## Machine Learning

**f**

## Gradient-based Optimization