

Time Resolved Fluorescence to Identify Plant Rare Earth Element Binding Peptides

Rare Earth Elements (REEs) are increasingly becoming critical resources for new technologies. Despite a relatively high abundance, concentrated deposits of REEs are rare and isolation and purification of REEs is economically and environmentally costly. US production is limited and China has come to dominate the worldwide REE supply. Biomining using plant-based peptides from REE hyperaccumulating plants may allow for expanded US production and separation of REEs. In order to identify potentially useful peptides, we are developing high throughput screening methods using time-resolved fluorescence of long lived f-f electronic transitions found in most REEs to identify and quantify REE binding. These long lived transitions enable the detection of REEs in living cells by allowing interfering biologically produced fluorescent signals to decay before an emission spectrum is taken, leaving only the fluorescence of the REEs. I have optimized the detection parameters to detect Europium and Terbium in both plant and yeast tissues. I am now screening for REE sensitizing compounds and beginning to assay REE binding of different isolated proteins.