## **Supplementary Materials**

Figure S1. TOCSY spectrum of TrxR and GPX SECIS

The spectra were recorded at 30°C inD<sub>2</sub>O.

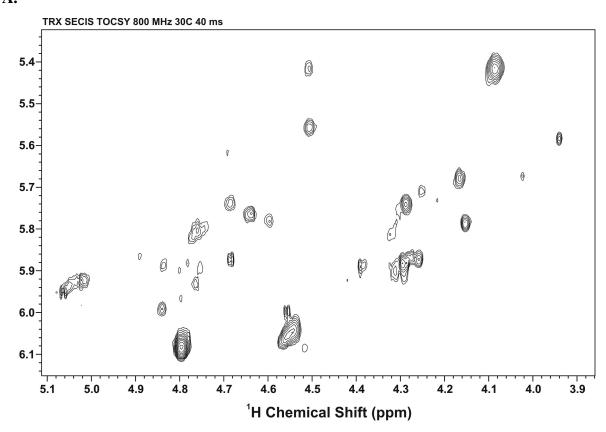
40 ms mixing time, 600 MHz  $D_2O$ . Anomeric to 2'/3' region. A small number of strong resonances is consistent with only a few residues having a significant H1'-H2' coupling or narrow lines.

- A. TrxR SECIS
- B. GPX SECIS

Figure S2. <sup>31</sup>P NMR spectra

Spectra were recorded at 14.1 T on a Varian Inova spectrometer using a 5 mm switchable X pfg probe. Spectra were recorded with an acquisition time of 1.5 s, a relaxation delay of 3.5 sec with proton Waltz decoupling centered at 4.6 ppm during the acquisition, but not during the delay to reduce heating effects.

Figure S1 A.



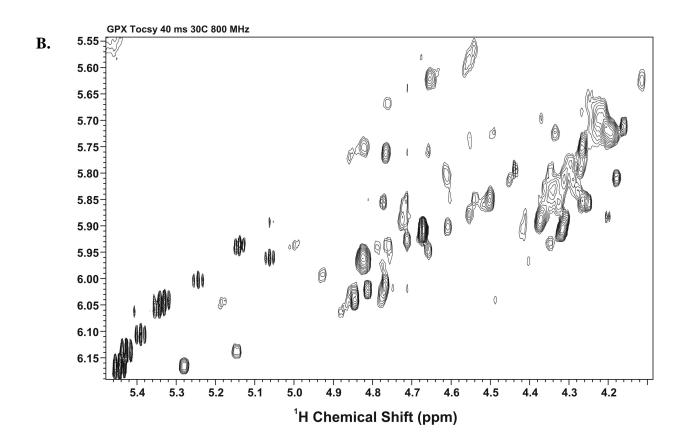


Figure S2

