In the previous projects, we developed the heat-to-sound and virtual-source principles of thermoacoustics. This project applied these thermoacoustics principles to design thermoacoustic transducers for measurement of fast-time heatflux from/to heating/cooling sources. The inverse thermoacoustic algorithm implemented thereon was fulfilled by the PID-adaptive state-input observer, a novel expansion of Lupberger observer theory. This heatflux sensor is now able to real-time measure the heatflux or entropy-flow with oscillating frequency larger than 230Hz, beyond the capability of thermoelectric sensors. Such an elegant performance is then utilized to study the self-excited thermoacoustic solar power and the occurrence of thermal inertia in the fast-time field.