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All materials can either reflect energy or radiate it. In 1894, Stefan Boltzmann defined the relationship between the heat radiated by a 'black' body and its absolute temperature in mathematical terms. For most materials, the ability to emit radiant energy is equivalent to its ability to absorb it. Simply stated, emissivity is a measure of this ability to radiate energy by a material. For example, an emissivity of 1.00 implies that the material is 100% efficient at radiating energy. A material like steel has emissivity of 0.1; in other words, steel is only 10% efficient at absorbing or radiating energy.

Infrared energy is invisible to our eyes, yet is experienced as energy in the form of heat. To maximize the efficiency of an infrared heater, the heating element (i.e. material) must have a very high emissivity in order to emit as much infrared heat energy as possible.

When I was contacted by Sunlighten to develop an advanced infrared heating material, my top priorities were safety and high emissivity. The end result is the employment of materials that have not only been approved by the FDA for applications involving food (ultimate safety), but more specifically, that can withstand temperatures significantly exceeding the operating temperatures of the sauna heater so as to prevent off-gassing. In terms of emissivity level, an independent laboratory certified that the proprietary infrared coating material I developed is 99% emissive between 2-15 microns, coming close to the theoretically perfect level of efficiency of a black body.

It is important to note that in addition to safety and emissivity, we must return to Boltzmann's Law in determining an optimal heater. According to him, Power (measured in watts) is also a function of heater surface area and temperature differential. In order to create an optimally radiating heater surface, these factors were taken into account along with emissivity. The net result was the creation of an infrared sauna heater – being used solely by Sunlighten – that produces the most robust infrared heat as measured by wattage density.

Exclusively marketed under the name Solocarbon and Solocarbon Custom Spectrum, I hereby attest that these heating technologies do indeed meet the most rigorous standards for safety, emissivity and power for infrared heater application.

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