



FIR-TEX™



PURPOSE

Purpose of this document is to present the technological fabric, **FIR-TEX™** with scientific facts and the literature behind the technology.

FORMULA

FIR-TEX LIMITED detains the secret of the formulas and their applications as well as the exclusive worldwide commercial rights.

1. What is the mechanism of action of Far Infrared Ray (FIR), the technology used in FIR-TEX?

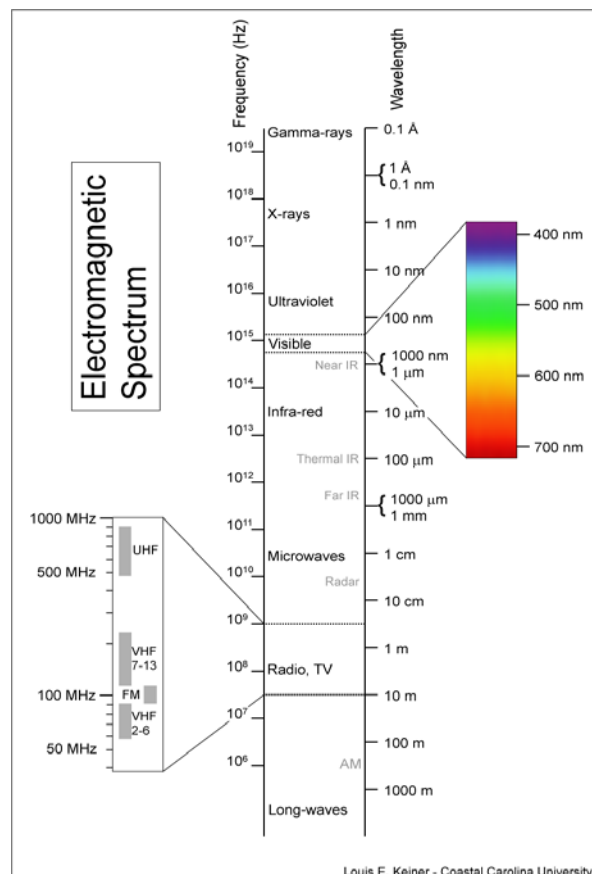
INFRARED RAYS

These rays were discovered in 1800 by **William Herschel**, a British musician and astronomer, when he observed that a thermometer placed just outside the visible spectrum of sunlight shows a greater increase in temperature than one placed in the red region. They are thus responsible for the heat we feel and 80% of the sun's rays are infrared.

The Infrared region of the spectrum lies beyond the red end of the visible range, with wavelengths between 0.01 to 7.5x10⁻⁵ cm

Solar irradiation is composed of electromagnetic waves which can be classified in:

- Cosmic rays and X rays
- Ultraviolet rays
- Visible light (from violet to red)
- Infrared rays (invisible)





Infrared rays are further divided in:

- Near Infrared
- Medium Infrared
- Far Infrared

Among the different frequencies composing the infrared spectrum, far infrared rays are the most beneficial for the living beings. Here are their three main features:

- Reflection:
 - Infrared rays can generate heat by direct irradiation but localized objects can also reflect them
- Penetration:
 - Far infrared rays deeply penetrate the living tissues
- Resonance:
 - By penetrating the living tissues, far infrared rays activate (water) molecules, increasing overall temperature of the system.

Because of their specific characteristics, far infrared rays are also called “bio-genetic rays” or physiological waves.

WIEN’s Law demonstrates these statements: (The law is named for Wilhelm Wien, who derived it in 1893 based on a thermodynamic argument.)

This law calculates the highest wavelength of radiation emitted by a body at a given temperature:

$$T \times \lambda = K$$

T: temperature, Kelvin scale (Celsius scale + 273)

λ: wavelength in microns

K: constant = 2896

According Wien law, at 35 °C, the highest wavelength of emitted radiation is 9,40 micron. This explains why human body easily absorbs far infrared rays between 4 and 16 microns. Far infrared rays deeply penetrate skin layers and resonate with water and organic molecules of our body.

In medicine, **body water** is all of the water content of the human body. A significant fraction of the human body is water. Lean muscle tissue contains about 75% water by weight. Blood contains 95% water, body fat contains 14% water and bone has 22% water. Skin also contains much water. The human body is about 60% water in adult males and 55% in adult females.

As FIR interacts with water molecules (water molecules are set into a rotation state → energy transfer) it causes a thermal reaction which increases tissues temperature. Human body reacts to this phenomenon by dilating blood vessels: in this way blood circulation is improved and more oxygenized blood reaches the muscles and tissues. (It does not increase the oxygen in the blood; it brings the naturally oxygenized blood in a more optimized way to the muscles and tissues.)

FIR-TEX technology works like an active mirror; it captures/receives the thermal radiations from the body heat. Then it reacts and uses these thermal/Far Infrared rays (rays of life) to send energy back into the body with multiple beneficial consequences on cells and tissues.

The blood in the body is composed of billions of Red blood cells (erythrocytes). A single drop of blood contains millions of red blood cells.

Inside each red blood cell there is a bright red coloured molecule called hemoglobin (Hb) which transports and DELIVERS Oxygen (O₂) from the lungs to the rest of the body tissues who, in return, will use this vital oxygen to function properly. Metabolic waste from the organs, cell and body tissues, such as carbon dioxide (CO₂), are transported away by the same blood, back to the heart and lungs to be cleaned.



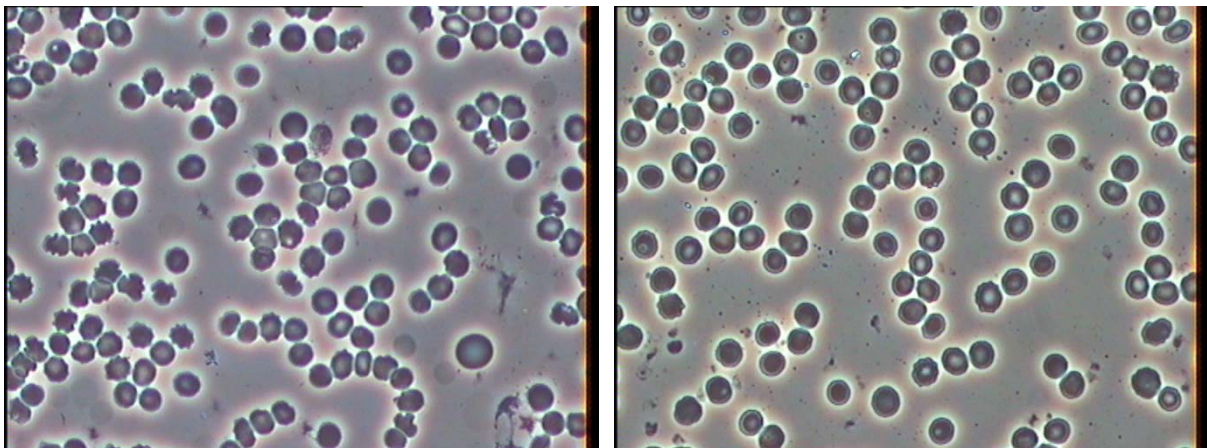
The life cycle of a red blood cell is about 120 days and 2 to 3 million red blood cells are replaced per second with new ones. We can prove, with scientific evidence, that some individuals using FIR-TEX have not only a reduced level of abnormally shaped Red Blood cells (Poikilocytosis*), but these cells are also more separated and less 'sticky' (from sugar/protein). As a consequence, the delivery of Oxygen and the elimination of waste gases from the entire organism is being optimized!

By achieving the above, FIR-TEX instantly improves the aerobic energy system and puts less strain on the heart thanks to a better flow. This should explain, among others, the excellent results the FIR-VEST has obtained during the active performance tests.

One of the direct and main benefits of using FIR-TEX is thus that it should improve your metabolism and (re)activate the vital energy of your body.

(*Poikilocytosis: This is damage (out of shape red blood cells) caused by free radicals. Free radicals enter the blood stream via over cooked /burnt food, stress, pollution, air conditioned buildings, processed food, smoking, chemicals, over exercising, dust, etc. They are atoms that are missing ions, so they are very unstable and become scavengers in the blood stream by stealing ions from red blood cells. When this happens damage occurs around the outside of the red blood cells making them go 'out of shape'. If this happens for a prolonged length of time then it is possible that cancer can develop.

LBA (Life Blood Analysis)



Person without FIR-TEX

Person with FIR-TEX (after 10')

Energy medicine is very old, at least as old as the first Qigong masters and other ancient practitioners of healing touch therapies. These healers all had in common the ability to emit energy through their hands, and so do many modern day healers, such as Dolores Krieger, Ph.D., R.N., who began teaching healing touch techniques in the U.S. in the 1970s. Contemporary researchers have now proved that these forms of energy medicine use wavelengths in the infrared range.

In a study at the National Yang-Ming Medical College in Taipei, Taiwan, published in the American Journal of Chinese Medicine in 1991, researchers measured the energy Qigong masters emit from their palms. The researchers employed electronic detection equipment but were also able to detect infrared energy by a rise in air temperature near the masters' palms. The study showed that emitted infrared Qi, or Chi (pronounced "chee" and essentially meaning energy in Traditional Chinese Medicine), has positive effects on human fibroblasts, the cells that rebuild connective tissue. The study also showed that infrared Chi stimulated a significant increase in cell growth, DNA synthesis and protein synthesis in cells.



Researchers in Japan have also performed studies of this infrared energy from the human palm, which they call Kikoh. At the Niwa Institute for Immunology in Tosashimizu, Japan, researchers examined Kikoh as well as materials that emit far-infrared radiation, including common granite stone, tourmaline (a type of granite), ceramic disks and hot spring water. In findings published in 1993 in the International Journal of Biometeorology, they reported that materials emitting far- infrared (FIR) energy appear capable of potentiating functions of white blood cells. These functions include increased immune defense response in which white blood cells surround and ingest small living things (such as bacteria) and cell wastes.

But is this warming effect of FIR different from that of a hot water bottle or heating pad? Yes, the vibrational energy of far-infrared light is unlike that of the heat energy we use, for example, in cooking. Think of it as the difference between leaning over a pot of boiling water and standing outside in the sunlight. Steam from boiling water can burn the skin but it doesn't heat internal organs. Sunlight heats us in a profound way because it contains penetrating far-infrared rays as well as the full range of energy in the electromagnetic spectrum.

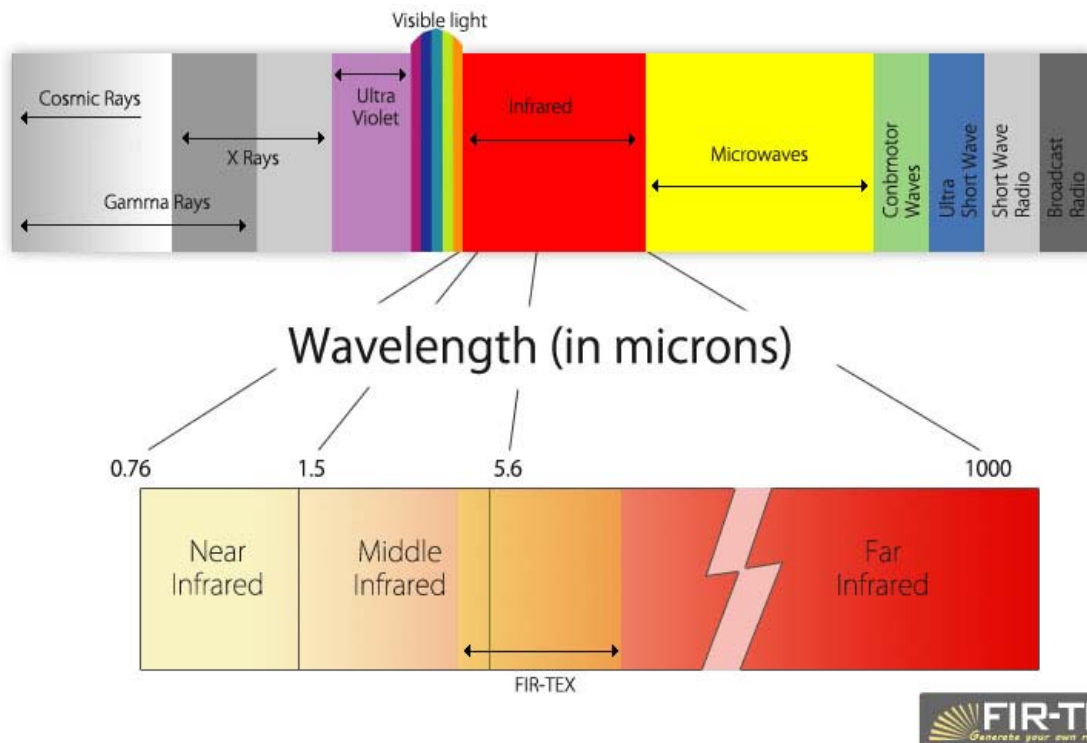
Everything in the universe emits and absorbs certain wave energies. If we look at a graphic representation of the electromagnetic spectrum, we see that infrared waves are longer than those in the visible range, falling just below ("infra") visible red light in the spectrum. Although the wavelengths of far-infrared are too long for our eyes to perceive, we experience the energy as gentle radiant heat.

At the molecular level, FIR exerts strong rotational and vibrational effects that are either biologically benign or, in certain processes, biologically beneficial. This healing ability stands in contrast to the damaging effects of short wavelengths, such as X-rays and gamma rays. The molecular effects of FIR are actually measurable through IR spectroscopy, a method of analyzing the emission and absorption of infrared light that reveals changes in atoms and molecules caused by IR energy

Humans, like other living organisms, have evolved to have a unique absorption spectrum and to respond specifically to particular electromagnetic wavelengths (EMWs). German professor Fritz Hollwich, Ph.D., conducted a study in the 1970s showing that individuals who sat under cool-white fluorescent lighting had elevated levels of the stress hormones ACTH and cortisol. There was no such stress response in individuals who sat under full-spectrum lights that simulated sunlight. (As a result of studies like this, the fluorescent lights are legally banned in German hospitals and medical facilities.) Dr. Hollwich's study is one of many that have shown that light has stimulatory and regulatory effects on biological systems.

Far-infrared light penetrates beyond the skin level and is absorbed efficiently by cells below, whereas visible light is mostly bounced off the skin surface. Near-infrared is mostly absorbed at the skin level and raises the skin temperature. Far-infrared can penetrate up to 4 centimeters (about 1-1/2 inches), exciting the vibrational energy of molecules and resonating with cellular frequencies. We can't exactly perceive the deep heating effects of FIR, though, because our body's ability to sense heat is mainly at the skin level. Nonetheless, the effects of FIR rays promote bioprocesses such as increased metabolism and blood circulation, and can raise core body temperature. NASA certainly understood some of these effects when it developed FIR materials for radiant heat during space travel. Hospitals have also taken advantage of some of these properties to keep newborn babies warm using FIR materials around incubators.

The mechanism of action is in some ways simple. It is related to vasodilatation, or increased blood flow and local temperature. The penetrating infrared energy brings nutrients and oxygen to the soft tissue region being treated and at the same time stimulates the removal of accumulated toxins. As cited earlier it does not increase the oxygen in the blood, it brings the naturally oxygenized blood in a more optimized way to the muscles and tissues.



Literature and sources about the interaction of FIR in general and its interaction with water:

- The journal of physical chemistry. B 2007;111(17):4446-52.
- The Astrophysical Journal, Volume 550, Issue 1, pp. 346-356.
- Alternative Medicine, January 2001, by D.J. Fletcher
- One clinical study done by Dr. Gordon Ko and Dr. David Berbrayer at Sunnybrook and Women's College Health Science Centers at the University of Toronto, published in the August 2002 issue of Alternative Medicine Review "Journal of Clinical Therapeutics"
- **Dr. Sasaki Kyo, M.D.** has done extensive research on the therapeutic uses of far infrared therapy. She is the author of "**The Scientific Basis and Therapeutic Benefits of Far Infrared Ray Therapy**" – which presents the clinical effects of far infrared ray therapy. It amongst others says that FIR Improves micro circulation by exerting strong rotational and vibrational effects at molecular level, it enhances the delivery of oxygen and nutrients in the blood cell to the body's soft tissue areas, it promotes regeneration and fast healing, it increases metabolism between blood and tissue and much more.
- **Therapeutic Effects of Far Infrared Heat** - Chapter 9 of *Therapeutic Heat and Cold, Fourth Edition*, Editors Justus F. Lehmann, M.D., Williams, and Wilkin. It says FIR therapy decreases joint stiffness, relieves muscle spasms, optimizes blood flow, affects soft tissue injury, increases the extensibility of collagen tissue and assists in resolution of inflammatory infiltrated, edema, and exudes.



2. How can FIR-TEX achieve what it claims?

For obvious reasons we will not divulge the details of our knowhow and even less our formulas. The exact Mineral Oxides mixture details and fabrication process of FIR-TEX are secret.

The technology combines the properties of:

- An inner mixture of natural and synthetic metal oxides which are treated at high temperature. After cooling the mixture is able to emit electromagnetic waves within 4 and 20 microns (Far Infrared Rays)
- A polymeric matrix, which is able to bind mineral to reach very high textiles performances.

FIR-TEX is an ennobled fabric; it uses a very high tech version of FIR (Far Infrared Rays), a proven safe method of natural health care! Thanks to a secret formula using tens of mineral oxides and a very specific application mode, FIR-TEX works like a reactive mirror; it captures the thermal radiations emitted by body heat and then it reacts and uses these thermal/Far Infrared rays (rays of life) to send energy back into the body (of which 95% is in the range of 4 to 16 microns as you can see in the far infrared emissivity spectrum below) with multiple beneficial consequences on cells and tissues obtaining results never achieved before.

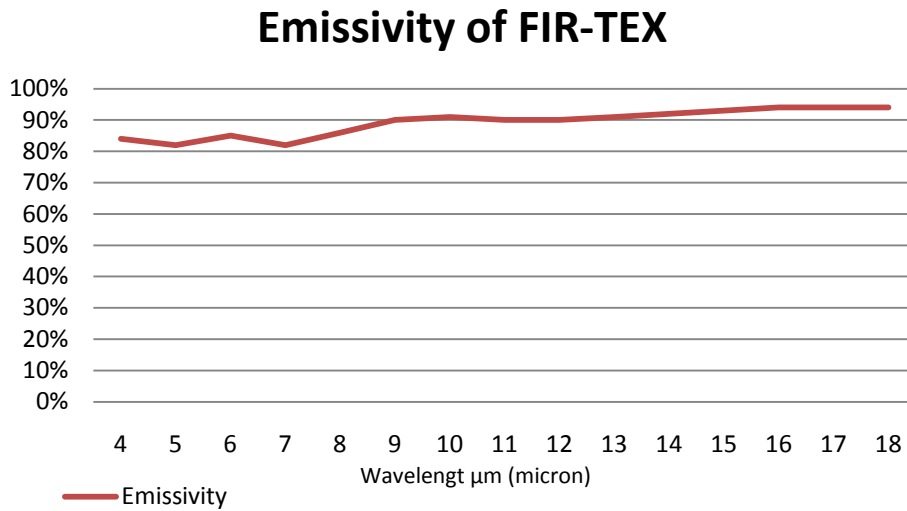
The FIR-VEST using FIR-TEX has been tested under scientifically approved protocols (double blind, placebo) and no matter if you are a sports man/woman, patient or even an athlete (WADA approved), these tests show that it will definitely provide you with optimized well being and/or performance. FIR-TEX also works very well on animals.

Scientific evidence shows that FIR-TEX can improve, among others, your balance, mobility and global performance thanks to, but not limited to, an improved (micro) circulation.

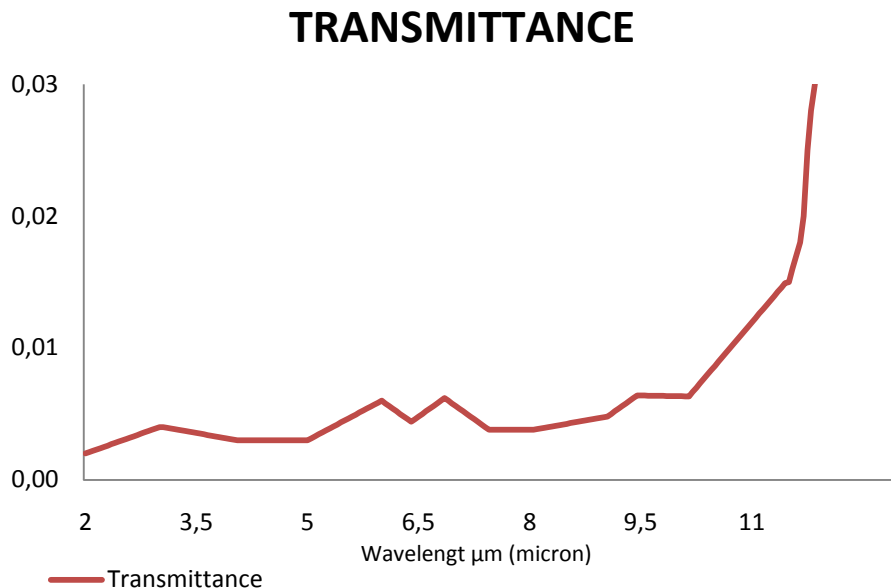
Updated April 27th 2010



The high level of emissivity of FIR-TEX is shown in the following far infrared emissivity spectrum:



The high thermo insulating properties of FIR-TEX are shown in the following diagram, which represents a far infrared spectrum (measured in transmittance) of the treated layer irradiated with infrared rays. It can be noticed that transmittance (the fraction of incident light at a specified wavelength that passes through a sample) is very low:





3. Can FIR-TEX harm health?

REACH is a new European Community Regulation on chemicals and their safe use ([EC 1907/2006](#)). It deals with the Registration, Evaluation, Authorisation and Restriction of Chemical substances. The new law entered into force on 1 June 2007.

The aim of REACH is to improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances. At the same time, innovative capability and competitiveness of the EU chemicals industry should be enhanced. The benefits of the REACH system will come gradually, as more and more substances are phased into REACH.

More information about REACH can be found on their official website http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm

The technology used in the FIR-TEX is REACH compliant!

Far Infrared Rays are no harm to the human body, in the contrary, without them we could not live.

Far Infrared heating systems have been tested in Japan and found free of toxic electromagnetic fields. The Swedish National Institute of Radiation Protection has also concluded that infrared heaters are not dangerous. Instead, Japanese researchers have reported that far infrared radiant heat antidotes the negative effects of toxic electromagnetic sources.

According to the *Clayton's Electrotherapy, 9th Edition*, far infrared radiation is the only antidote to excessive ultraviolet radiation.

In Japan, Hideyoshi Toyokawa and others researched the effects of FIR on wound healing. The results showed that FIR can improve wound healing significantly. The results can be read at Experimental Biology and Medicine online journal: - www.ebmonline.org