Far Infrared Silicon Diodes Treat Burns

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The St. Petersburg researchers (Russia) suggest that infrared emission should be used to treat burns. A unique device based on silicon light-emitting diodes was developed by the St. Petersburg physicists – specialists of the Ioffe Physico-Technical Institute, Russian Academy of Sciences, and the St. Petersburg State Electrotechnical University. Emission of far infra-red range of wave-lengths generated by this device will help to cure in an ordinary hospital even such burns that could be previously treated only in specialized burn centers. The Foundation for Assistance to Small Innovative Enterprises (FASIE) will help the researchers to arrange production of remarkable devices.

The Foundation for Assistance to Small Innovative Enterprises (FASIE) will help the authors in the framework of the “Start” program to develop and begin production of devices required for such treatment based on silicon light-emitting diodes.

“The fact that the far infrared emission promotes quicker healing of burns can be considered ascertained, says project manager, Professor Bagrayev, Doctor of Science (Physics&Mathematics). We have already made sure of that through applying the small-size device developed by us, which proved well in treating arthrosis, wounds, ulcers and bedsore. It has turned out that in case of burns the device helps very efficiently: affected surface heals quicker and hurts less. However, irradiation of a large surface accordingly requires the radiation source of a larger flat area than the one previously used.

The problem is that until now there existed no far infrared radiation

sources of a larger flat area. That is why we have patented our apparatus and treatment mode not only in Russia but also abroad. The radiation spectrum required for efficient treatment should be wideband one, from 3.5 through 40 microns, while all previously known far infrared light-emitting diodes either had narrow radiation spectrum and were expensive or provided strong parasitic effect - emission in the near infrared area. That is, they heat up the patient too much and can even burn the patient, which is absolutely unacceptable."

The far infrared range panel emitters developed by the group under guidance of N.T. Bagrayev are based on silicon. The researchers have developed technology, which allows to grow extra small p-n barriers (only two to three nm deep) on the surface of single-crystalline silicon, i.e. tiny radiating light-emitting diode elements parted by 2 nm thick barriers.

However, the value of that structure would have been low, if the authors did not invent the way to reinforce emission from these extrasmall light-emitting diodes. And they did invent it! The researchers learned to grow a resonator layer on the same plate - silicon microscopical pyramidia, covering all over the formerly smooth crystal boundary, consisting of multitude radiating elements.

Based on such well-disposed rows of silicon light-emitting diodes, the researchers have now learned to produce large panels (the square being 1.8 m x 0.6 m), each of the panel will contain 108 pieces. Final clinical trials of the new device in the Vishnevsky Scientific Research Institute are scheduled for April this year, but the authors do not expect any troublesome surprises: all preliminary tests have been successful. Moreover, the researchers are sure that the device they have developed will be efficient even in cases that seemed hopeless so far– i.e., patients in shock condition, with large area of burns.

The first infrared devices for treating burns are scheduled for release already by the end of 2006. These vitally important devices will be produced by a small-scale enterprise to be set up in the framework of the ‘Start” program with the help of the Foundation for Assistance to Small Innovative Enterprises. The enterprise will be called “Dipole Structures”.

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