



## Apparatus for Heat Enhanced Pulse Oximetry Measurements (VA Reference No. 11-099)

*Novel device for providing reliable pulse oximetry measurements of oxygen saturation and heart rate*

### Technology

Pulse oximeter

### Inventors

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### Key Features

- Provides reliable pulse oximetry measurements in patients with low body temperature
- Secures chemical energy heating source and probe to the body for the pulse oximeter measurement
- Could be designed as a single use probe or reusable
- Could prevent misdiagnosis, prevent incorrect treatment, and reduce patient risk during medical procedures

### Stage of Development

Reduced to practice with prototypes developed and tested in clinical research studies

### Keywords

Pulse oximetry  
Pulse oximeters  
Blood oxygen saturation  
Hypoxemia

### Patent Status

Patent pending

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### Technology

Pulse oximetry has gained widespread clinical acceptance as a standard patient vital sign measurement because it can give clinicians an early warning of low arterial blood oxygen saturation levels, or hypoxemia. Conventional pulse oximetry is subject to technological limitations that reduce its effectiveness and the quality of patient care. To mitigate the limitations of current technologies, the Department of Veterans Affairs (VA) has developed a novel device for providing reliable pulse oximetry measurements of oxygen saturation and heart rate when low body temperature in patients results in vasoconstriction and low blood perfusion.

The novel device consists of a pulse oximeter probe integrated into a bandage-like harness, which contains a chemical energy-heating source. The device is adapted to reversibly secure the heating source and the pulse oximeter probe to the body region at which the pulse oximeter measurement will be made. The pulse oximeter probe may be configured for the transmission mode, the reflectance mode, or for both modes. The chemical energy source for the device is in the form of a mixture that includes a metal powder, which generates heat energy at a predetermined rate via the oxidation of the metal powder when exposed to atmospheric air. The pulse oximeter probe could either be designed as a single use probe or reusable upon replacement of the chemical energy-heating source.

### Opportunity

Pulse oximetry has emerged as an established standard for measuring vital signs. As a result, the global market for pulse oximeters is expected to increase to \$575 million by 2015 with an estimated annual growth rate of 6 percent to 8 percent. Growth in the pulse oximetry market is driven by ongoing adoption of low perfusion, motion-tolerant technology; rising patient acuity, or severity of illnesses, which increases the need for patient monitoring; and greater efficiencies for the health care worker through increased reliability, improved detection algorithms and the ability to reject false alarms.

### Competitive Advantage

With conventional pulse oximetry, arterial blood signal recognition can be distorted by motion artifact, or patient movement, and low perfusion, or low arterial blood flow. Low perfusion can also cause conventional pulse oximeters to report inaccurate measurements, or in some cases, no measurement at all. The inability of obtaining accurate oxygen saturation measurements can lead to misdiagnosis, incorrect treatment, and the increase of patient risk during medical procedures. The novel device developed by the VA offers improvements over existing devices in situations when low body temperature in patients results in vasoconstriction and low blood perfusion resulting in unreliable pulse oximetry measurements.

### Status

The Department of Veterans Affairs is looking for a partner for further development and commercialization of this technology through a license and the VA inventors are available to collaborate with interested companies through a Cooperative Research and Development Agreement (CRADA).