

Mission

Active Spectrum Inc., develops and manufactures the world's smallest electron spin resonance spectrometer, called Micro-ESR™. Available in benchtop and online configurations, Micro-ESR™ measures composition and concentration of free radicals, providing health measurement of oil and other materials in petrochemical, food, lubricant, biomedical and academic markets. Applications include analysis of antioxidants, lubricants, crude oil, catalysts, chemical additives, biodiesel, shelf life of vegetable oil, food and many others.

Core Competencies

Active Spectrum's core competencies are in design and manufacturing of high-performance magnetic resonance based chemical sensors. We have extensive experience in sensor design and manufacturing, coupled with decades of experience in high-frequency circuit engineering.

Our core competencies are in the following technology niches:

- Chemical sensor technology.
- High-frequency RF circuit design.
- Prototyping, test and short-run manufacturing.

Applications:

- **Petroleum:** Active Spectrum offers a rapid and relatively inexpensive non-destructive test for asphaltene and vanadium concentration in crude oil. Our technology continuously measures asphaltenes down to 0.5% concentration, and Vanadium (in the form of vanadyl porphyrin) concentrations down to 5ppm. These tests are available for both our online and benchtop Micro-ESR spectrometers. Customized solutions include explosion-proof enclosures, high-pressure and/or high-temperature sampling options and custom connectors and data interfaces.
- **Food Industry:** Oxidative stability of food products is a key indicator of shelf life. ESR has been widely applied in the analysis of beer, wine, vegetable oils, emulsions and even solid foods. Spin-trapping of free radicals in food is a key quantitative assay for shelf life determination. Our technology dramatically reduces the cost of this type of analysis.

- Lubricants:** Our on-line and benchtop Micro-ESR technologies enable measurement of oxidation and soot levels in all types of lubricants and hydraulic fluids. This technology, developed for the US Navy and US Army, can offer rapid analysis of lubricant condition, without the need for sampling or any user intervention. And because the test is 'absolute,' no reference samples are required. Simple, powerful, online chemical analysis of lubricants.
- Biomedical Research:** ESR is the gold standard for spin-trapping of NO_x and RO_x species in biomedical research. Our easy-to-use, low-cost Benchtop instrumentation renders this technique accessible to scientists and researchers at all levels. There is no longer any need to wait for shared facilities. TEMPOL in water or buffer can be measured at concentrations as low as 0.5 micro-molar.

Products

Our commercial products currently include:

Product	Description
Benchtop Micro-ESR (S-band)	Our most cost-effective miniature ESR spectrometer product. This spectrometer operates at 3.5 GHz and is optimized for measurement of aqueous samples.
Benchtop Micro-ESR (X-band)	Our highest performance miniature ESR spectrometer system. This spectrometer operates at 9.6 GHz and is optimized for laboratory research, analysis of crude oil, lubricants and irradiated foods and plastics.
On-line Micro-ESR (S-band)	Our most cost-effective miniature ESR spectrometer. This product is primarily used for online analysis of soot emissions, and in some specialized research applications.
On-line Micro-ESR (X-band) (Available mid-2011)	Our highest sensitivity Online Micro-ESR. This system is optimized for online analysis of crude oil, thermal oxidation of lubricants and other industrial applications requiring very high sensitivity.
Octave+ series of Tunable RF Filters	We manufacture a full line of RF tunable filters, with full-octave tuning ranges from 225 MHz up to 6.0 GHz. Insertion loss of less than 1.0 dB for a 2% bandwidth, and power handling of up to 50W.

Miniature High Power Filters	High power, small form-factor, fixed frequency RF filters. These filters are custom designed for applications requiring the smallest possible package dimensions yet high power handling. Average signal power of 50W, and customizable frequency and bandwidth between 225 MHz and 6.0 GHz or higher. Applications include LTE (4G) and advanced communications systems.
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Customers

Our customer list spans most of the world's largest industrial and petrochemical giants in addition to many prestigious universities and research institutions.

History

Active Spectrum Inc., was started in 2005 by brothers Dr. James White and Dr. Chris White. The original concept and IP for the Micro-ESR sensor was developed as part of Dr. Chris White's Ph.D thesis at Caltech. Subsequent to an intensive 24-month technology development, we launched our first commercial products in 2008. Since the launch of our original S-band Micro-ESR, we have seen remarkable sales growth, with sales doubling year-over-year for 3 consecutive years.