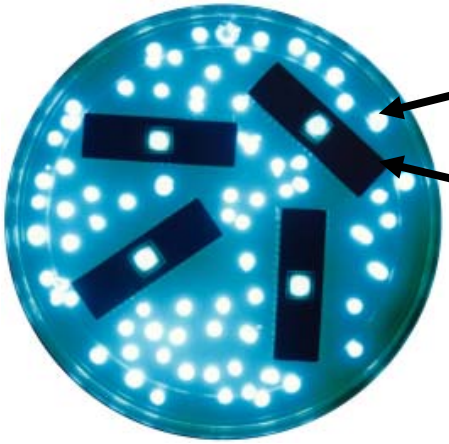
Bioluminescent Bioreporter Integrated Circuits

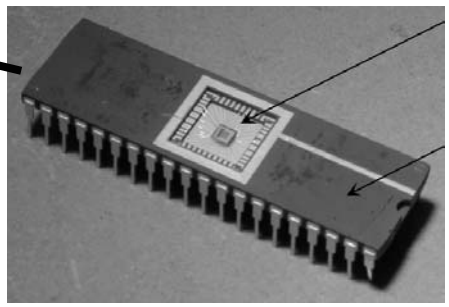
Chemical or Radiation Sensing Platform

Bioluminescent Bioreporter Sensor

ORNL, in collaboration with the University of Tennessee, has developed CMOS-based integrated circuits that provide a direct measurement of contaminants or radiological exposure. Bacteria have been genetically modified to produce light in response to the amount of exposure (chemical or radiological) received in the environment. The heart of the CMOS-based integrated circuit is an optical application specific integrated circuit (OASIC) that transduces bioluminescence to an electric output that is directly related to the amount of chemical or radiological exposure.



Genetically modified bacteria



CMOS-based OASIC

Capabilities

- Variety of bacteria has been genetically engineered for various chemicals
- Has been tested for air and ground water applications
- Is low power and power management built in
- Has been prototyped with wireless communications
- Potentially low cost

Future Development

- Extended bacterial viability via temperature stabilization and media/moisture provisions
- Air sampling and sample concentration systems

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