A strain of B. subtilis has been used as a biosensor for cadmium. The system consists of a metal-responsive promoter and a reporter gene (CopZ) that produces a fluorescent protein (CFP). The expression of the CFP is repressed by the presence of cadmium in the environment. However, the expression of the reporter gene can be increased by knocking out a repressor gene (mntH). This allows for a simple and sensitive detection of cadmium levels in various environmental samples.

The system has been successfully characterized and validated using different metal ion concentrations. The results show that the system is capable of detecting low levels of cadmium with high specificity and sensitivity. The biosensor has been tested in different environmental matrices, including soil and water samples, and has shown excellent performance in detecting cadmium contamination.

In conclusion, the development of this metal biosensor is a significant achievement in the field of environmental monitoring. The system offers a rapid, cost-effective, and non-invasive method for detecting cadmium contamination, which can be useful in various applications such as environmental monitoring, food safety, and industrial hygiene.