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(57) Abstract :

The invention discloses an engineered bacterial platform (100) designed for efficient bioremediation of toxic pollutants in contaminated environments. The system includes a bacterial chassis (110) equipped with pollutant recognition modules (120), degradation enzymes (130), stress-resistance circuits (140), adaptive genetic regulators (150), biosensing outputs (160), and biosafety modules (170). The invention enables effective degradation of hydrocarbons, pesticides, and heavy metals while providing real-time monitoring and ensuring safe containment. This eco-friendly, scalable, and sustainable solution addresses environmental pollution with high efficiency and reliability.

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