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(57) Abstract :
The invention relates to an automated cell culture flask integrated with real-time nutrient replenishment and waste removal sensors. The flask (10) incorporates optical sensors (16) and electrochemical sensors (18) for continuous monitoring of pH, glucose, and waste metabolites. A microcontroller (22) controls microfluidic pumps (26) to deliver fresh media via inlet (28) and remove waste through outlet (30). Wireless connectivity (38) enables remote monitoring, ensuring optimal cell growth, reduced contamination risk, and enhanced reproducibility compared to conventional manual culture methods.

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