

Abstract

This paper presents a teaching kit that combines the fabrication of a low-cost microcontroller-based potentiostat and a LabVIEW-generated graphical user interface. The potentiostat enables undergraduate-level students to learn electroanalytical techniques and characterize energy conversion devices such as solar cells. The purpose of this teaching module is to make the introduction of electrochemistry accessible to undergraduate laboratories, especially those with limited financial resources and without expertise in electronics or programming. The electronic circuit components for the potentiostat are readily available and easy to assemble. The graphical user interface replaces any programming-based interface, displays data in real time, and interacts with user commands. The software package is a stand-alone executable file that is compatible with any PC and is provided in the Supporting Information. Cyclic voltammetry, linear sweep voltammetry, and chronoamperometry functions are demonstrated with representative electrochemical experiments, and the data obtained are comparable to those obtained with a research-grade potentiostat. This teaching module is user-friendly so that it can be easily adapted into the undergraduate classroom. We make available in the Supporting Information all of the necessary instructions and information, including schematics for the potentiostat, circuit layout, electronic components, case fabrication, step-by-step instructions for assembly, software user interface, and detailed operating instructions.