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ZHONGNAN DAXUE XUEBAO(ZIRAN KEXUE BAN)

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用BP神经网络提高锂离子电池化成系统采样精度

吴免利[1]，李劼[1]，肖昕[2]，邹忠[1]

(1．中南大学 冶金科学与工程学院，湖南 长沙，410083；
2．中南大学 信息科学与工程学院，湖南 长沙，410083)

摘 要：针对自行设计的YX-20A型锂离子电池化成柜采样精度不高的问题，分别采用动量梯度下降法和L-M优化法以三层BP神经网络为预测模型对采样电流数据进行校正；并用校正后的采样数据通过TL494芯片调节设定基准和充放电电流实测值的偏差。研究结果表明： L-M算法能快速收敛，效果优于动量梯度下降法，当隐含层节点数为9时，L-M算法效果最佳；校正后的电流最大相对误差由原来的5%降到1.1%左右，平均误差小于0.5%；校正后基准电流和实测值间的相对误差波动较平缓，其最大相对误差比校正前有明显下降。

关键字：L-M BP神经网络；锂离子电池；化成系统
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Improvement of sampling precision in Li-ion battery formation system by using BP neural network

WU Mian-li[1], LI Jie[1], XIAO Xin[2], ZOU Zhong[1]

（1. School of Metallurgical Science and Engineering, Central South University, Changsha 410083, China;
2. School of information Science and Engineering, Central South University, Changsha 410083, China）

Abstract: Aiming at the solution of low sampling precision problem of developed YX-20A Li-ion formation equipment, two improved algorithms of three layers back-propagation neural network, namely gradient descent with momentum and Levenberg-Marquardt optimization, were introduced as forecasting models to correct the sampling electric current data; then the corrected sampling data were used to adjust deviation between basic set-point values and measured ones through TL494 chip. The results show that Levenberg-Marquardt optimization with 9 nodes in its hidden layer has the advantages of faster learning rate and higher precision; the maximum relevant error between former electric current and corrected values declines from about 5% to 1.1%, and the average relevant error is less than 0.5%; the corrected relevant errors between measured values and basic set-point values fluctuate gently, and the maximum relevant error goes down evidently by amelioration.

Key words: Levenberg-Marquardt BP neural network; Li-ion battery; formation system

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地 址：湖南省长沙市中南大学 邮编： 410083
电 话： 0731-88879765 传真： 0731-88877727
电子邮箱： zngdxb@mail.csu.edu.cn 湘ICP备09001153号