

Student Materials Research Activities

Students have the opportunity to perform materials research on the microstructure and mechanical properties of materials, especially metals/alloys of industrial interest and structural wrought iron of historical significance. Modern metallographic sample preparation and characterization (optical macroscopy/microscopy) and micro- and macro-indentation hardness equipment are accessible for student use. This can occur either during the school year (including course credit) or during the summer as the recipient of a Hauber Research Fellowship. At times, students have made sufficient progress to warrant presentation at a national meeting or publication in a journal as listed below.

Indentation Hardness Testing of Industrial Materials:

1. "Vickers Microindentation Hardness Testing of Brazed Joints in Aluminum," P.B. Roy, F.M O'Connell, T.H. Callahan, E.J. Armellino, and W.L. Elban, presented at the 2012 National Educators' Workshop, appears as a materials education module (2013) at (<http://materialeducation.org/educators/matedu-modules/>).
2. "Metallurgical Characterization of Refrigeration Tubing Formed from Plain Carbon Steel Strip Stock," W.L. Elban and K.F. Rowe, *Journal of Manufacturing Processes*, Vol. 10 (2008), pp. 89-95.

Historical Ferrous Metallurgy:

1. "Metallurgical Assessment of Historic Wrought Iron: U.S. Custom House, Wheeling, West Virginia," W.L. Elban, M.A. Borst, N.M. Roubachewsky, E.L. Kemp, and P.C. Tice, *APT Bulletin: The Journal of Preservation Technology*, Vol. XXIX (1998), pp. 27-34.
2. "Metallographic Examination and Vickers Microindentation Hardness Testing of Historic Wrought Iron from the Wheeling Custom House," W.L. Elban, M.A. Borst, N.M. Roubachewsky, E.L. Kemp, and P.C. Tice, in *Microstructural Science, Volume 24: Understanding Microstructure: Key to Advances in Materials (Proceedings of the 29th Annual Technical Meeting of the International Metallographic Society)*, June 1997, pp. 177-183.