

## Appendix C – Equipment

Using an approach to leverage research and private funding, the department has been successful to supplement limited state support for new equipment. Major pieces of equipment used by the program in support of instruction acquired since the last review (acquired since 2010) are summarized in Table C-1. Highlights include the following.

- 3D X-ray MicroCT system (NSF MRI proposal)
- Potentiostat, autoclave, and thermogravimetric analyzer (grants for critical minerals extraction)
- Atomic force microscope upgrade (SD Board of Regents)
- Grinder polishers and mounting press (industry donations)

Major equipment for the department acquired before 2010 is shown in Table C-2. The entire list of available equipment is available on request.

In addition to this equipment, the department has access to and uses equipment located in the Arbogast Advanced Manufacturing Center. This includes the following equipment:

- Five-axis friction stir welder
- Materials testing systems 110 kip and 70 kip
- Direct deposit laser deposition system with inert atmosphere and programmable 3-D position 2 kW YAG laser fitted with dual powder feeders
- Ultrasonic welder
- Cold Spray units
- Water jet cutter (10-x14-ft tank)

The department also has equipment not listed on the inventory list in Table C-1 including:

- Vacuum 30 kW induction melter
- Ultra-purity Zone refiner (1 meter, induction heated, inert and hydrogen gas atmosphere)
- Czochralski Crystal grower (4-x4-in. melt pool, 25 kW induction generator)

Table C-1 Capital assets acquired since 2010

Asset Description	Acq Date	Cost	Room	Location
Leco, PR-36 Electro-hydraulic mounting press	08/06/2015	8,662	124	MI
Thermo Scientific, Still, 2 gph 120/208v 3ph	02/25/2015	6,358	126	MI
Workstation, Na-Haworth Unigroup: 48"x 24"	10/03/2014	14,682	123	MI
Millermatic 252, MIG Welders (2)	06/01/2014	5,000		MF
Lincoln Electric Precision TIG 225 Welders (2)	06/01/2014	5,000		MF
TA Instruments, Thermogravimetric analyzer with Au, 953000.908-Q500	02/18/2014	42,670	127	MI
Potentiostat/galvanostat/EIS analyzer, Parstat 4000	02/11/2014	46,647	131	MI
Pressure reaction apparatus, 4531-t-625-m(hc),115v	02/10/2014	29,698	131	MI
Sieving riffler, 02001-1-	01/27/2014	7,094	131	MI
Bruker Multimode 8-Upgrade Atomic Force Microscope + accessories	01/10/2013	174,970	127	MI
Video spectral comparator, VSC-6000/HS and Foram Raman	06/27/2012	178,083	228	MI
Action Mining Services, M5 Micron Mill Wave Table	05/22/2012	3,977	130	MI
Xradia, 3D X-ray tomography, MicroXCT-400, high-resolution, 1007548	05/11/2012	612,000	128C	MI
Metaserv 250 twin grinder polisher, 4910057	07/28/2011	15,447	124	MI
QPEC #7 Flotation Cell	05/30/2011	5,000	130	MI
Tube furnace	07/01/2010	6,470	121	MI
Hydrogen palladium purifier	05/24/2010	5,503	121	MI
Eriesz Magnetic separator	04/21/2010	13,181	130A	MI

Table C-2 Capital assets acquired before 2010

Asset Description	Acq Date	Amount	Room	Location
Carbon coater	12/30/2009	25,673	234	MMI
Rame-Hart Model 500 Advanced Goniometer/tensiometer	08/13/2009	36,870	113	MMI
Micro-force test system, MTS	08/13/2009	129,902	123	MMI
Air hammer	12/08/2008	6,393		MF
Tester, microhardness	05/14/2008	11,731	125	MMI
Image analysis system (microscope)	05/14/2008	16,000	124B	MMI
Action Mining Services, M5 Micron Mill Wave Table	05/22/2012	3,977	130	MMI
Grinder-polisher	04/28/2008	5,048	124	MMI
Abrasive cut-off saw	04/24/2008	5,978	125	MMI
Viscosity meter	12/18/2007	5,608	102	MMI
Prepregger, hot melt unidirectional	08/20/2007	470,000	112	MTDL
Trailer, 8x20 tandem auto	07/01/2007	7,030		MMI
Ellipsometer, discrete wavelength	05/07/2007	43,105	127	MMI
Electrometer	03/20/2007	5,456	111	MMI
Plasma cleaner w/vacuum pump	01/17/2007	8,288	113	MMI
Three roll mill	01/12/2007	11,245	111	MMI
Wilhelmy Plate Surface tension meter	12/21/2006	30,968	113	MMI
Dimatix materials printer	07/14/2006	31,720	102	MTDL
Ultra-microtome	06/30/2006	34,193	211	MEP
Spin coater	06/27/2006	5,477	113	MMI
Bath cryostat system	06/14/2006	29,121	133	MEP
Impact tester	06/07/2005	34,000	125	MMI
Nicomp 380 submicron particle size analyzer w/zeta potential	02/01/2005	53,182	113	MMI
Bohlin Rheometer	06/15/2004	32,945	113	MMI

Table C-2 Capital assets acquired before 2010 (Cont'd)

Asset Description	Acq Date	Amount	Room	Location
Bath cryostat system	06/14/2006	29,121	133	MEP
Impact tester	06/07/2005	34,000	125	MMI
Nicomp 380 submicron particle size analyzer w/zeta potential	02/01/2005	53,182	113	MMI
TA Instruments Q400 Thermomechanical analyzer	10/23/2003	46,158	127	MMI
Hot disk base w/desktop computer	05/20/2003	62,000	113	MMI
Specimen mounting press	05/15/2003	8,979	124	MMI
TA Instruments Q100 Differential scanning calorimeter	04/15/2003	36,039	127	MMI
TA Instruments Q800 Dynamic mechanical analyzer	04/15/2003	51,683	102	MCM
Leco image analysis system (upgrade)	04/15/2003	15,597	124B	MMI
Microtrac Laser particle analyzer	02/13/2003	44,076	113	MMI
Manning Polymer modulator	11/21/2002	22,390	123	MMI
Rheometric Minature materials tester	08/31/1998	9,500	124B	MMI
Microscope, Olympus	06/29/1998	27,137	324	MMI
Flotation machine cell	06/12/1996	5,000	130	MMI
Jaw crusher	06/12/1996	5,000	130	MMI
Tester, microhardness	10/01/1994	16,000	125	MMI
Goniometer	06/01/1993	13,253	127	MMI
Computer system IBM	06/01/1992	36,279	102	MMI
Grinder, dimple	07/01/1991	8,280	128C	MMI
Image Analysis System	09/01/1990	70,500	124B	MMI
Furnace, induction	04/01/1990	63,414	121	MMI
Furnace, tube/controller	06/01/1989	5,039	130A	MMI

Table C-2 Capital assets acquired before 2010 (Cont'd)

Asset Description	Acq Date	Amount	Room	Location
Ion Millier Fischion	12/01/1993	48,157	240	MEP
Goniometer	06/01/1993	13,253	127	MMI
Computer system IBM	06/01/1992	36,279	102	MMI
Grinder, dimple	07/01/1991	8,280	128C	MMI
Image Analysis System	09/01/1990	70,500	124B	MMI
Furnace, induction	04/01/1990	63,414	121	MMI
Furnace, tube/controller	06/01/1989	5,039	130A	MMI
Separator, magnetic	10/01/1987	8,000	126	MMI
Furnace, triple console	12/01/1976	5,268	128B	MMI
Test System, MTS	10/01/1974	23,917	125	MMI
Spectrometer, mass	07/01/1974	23,280	121	MMI
Rolling mill w/drive	12/01/1962	14,917	125	MMI

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