Chronological Malachite References

Dr. James Shigley 28 October 2024

Fontana, F. (1778). Analyse de la malachite. *Observations et Mémoires sur la Physique, sur l'Histoire Naturelle, et sur les Arts et Métiers*, Vol. 11, No. 1, pp. 509-521.

Gerhard C.A. (1783) Ueber die Entstehung der fasrigen Stein und Erzarten. *Schriften der Gesellschaft Naturforschender Freunde zu Berlin*, Vol. 4, pp. 291-305.

Schröter, J.S. (1787 and 1788). Nachrichten von einigen russischen Mineralien. *Der Naturforscher,* Vol. 22, pp. 167-182 and Vol. 23, pp. 54-101.

Anonymous (1795 and 1797) Beytrage zu einer Oryktrographie von Russland und vorzuglich von Sibirien. *Neues Bergmannisches Journal*, Vol. 1, pp. 169-191 and 193-241.

Klaproth, M.H. (1797). Chemische Untersuchung des sibirischen Malachits. *Beitrage zur chemischen Kenntnis der Mineralkorper,* Vol. 2, No. 66, pp. 287-290.

Bindheim, J.J. (1799). Ueber das sibirische Kupfergrun. *Der Gesellschaft Naturforschender Freunde zu Berlin - Magazin für die neuesten Entdeckungen in der gesammten Naturkunde*, Vol. 2, pp. 232-235.

Bruckmann U.F.B. (1800) Ueber ein antikes kupfernes Instrument, das einer Malachitrinde uberzogen ist. *Chemische Annalen für die Freunde der Naturlehre, Arzneygelahrtheit, Haushalttungskunst und Manufakturen,* No. 2, pp. 263-265.

Klaproth, M.H. (1801). *Analytical Essays towards promoting the Chemical Knowledge of Mineral Substances,* 591 pp.

Cadet de Gassicourt C.L. (1816) [Imitation malachite and pearls]. *Bulletin de la Société d'Encouragement pour l'Industrie Nationale*, Vol. 10, pp. 210-211.

Phillips, R. (1818). A comparative analysis of the green and blue carbonates of copper. *Journal of Science and the Arts*, Vol. 4, No. 8, pp. 273-281.

Anonymous (1823). Ueber Bereitung der Kupferlasur (Malachites), als Mahlerfarbe, und Bereitung des Bergblau und Berggrun. *Dingler's Polytechnische Journal*, Vol. 11, No. 4, pp. 455-462.

Anonymous (1826). Produits de la fabrique de malachite d'Ekaterimbourg. *Bulletin des Sciences Technologiques*, Vol. 5, pp. 267-268.

Rose G. (1829) Rapport sur les minéraux cristallisés, qui se trouvent dans les mines d'or et de platine de l'Oural. *Bulletin de la Société Impériale des Naturalistes de Moscou*, Vol. 1, pp. 355-356.

Senff, J. (1830). Die Saulen des Isaaks-Kirche zu St. Petersburg. *Journal für die Baukunst*, Vol. 3, No. 1, pp. 120-122.

Le Grice H. (1832) Columns of malachite. *Transactions of the Society for the Encouragement of Arts, Manufactures and Commerce*, Vol. 49, No. 1, pp. 38-40.

Anonymous (1835) Masse gigantique de malachite. *Nouvelles Annales des Voyages*, Vol. 7, pp. 376-378.

Becquerel A.C. (1835) Sur les moyens de produire à l'aide de forces électriques très faibles, de la malachite semblable à celle que l'on trouve

dans la nature. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, Vol. 1, p. 19.

Anonymous (1836) Bloc colossal de malachite, trouvé dans la mine de Miedno-Roudiansk près de l'usine de Tagilsk. *Annuaire du Journal des Mines de Russie*, pp. 321-324.

Murchison R.I., de Verneuil E., Von Keyserling A. (1845) Copper ores and great mass of malachite. *The Geology of Russia in Europe and the Ural Mountains*, Vol. 1, pp. 372-375.

Anonymous (1846) [Minerals of the Ural Mountains]. *American Journal of Science*, Vol. 52, No. 4, pp. 119-123.

Becquerel A.E. (1852) Nouveaux développements relatifs aux effets chimiques produits au contact des solides et des liquides. *Bulletin de la Société française de Minéralogie,* Vol. 34, No. 16, pp. 573-579.

Anonymous (1853). Malachite. *Littell's Living Age*, Vol. 39, No. 495, pp. 414-416.

Anonymous (1854) A Russian stranger—Malachite. *Household Words,* Vol. 8, No. 183, pp. 91-94.

Anonymous (1855) Einige Worte über die Malachit-Lager im Ural-Gebirge. *Magazin für die Kunde des Geistigen und Sittlichen Lebens in Russland*, Vol. 3, pp. 487-488.

Anonymous (1855) Einige Worte ueber die Malachit-Lager in Ural Gebirge. *Archiv für Wissenschaftliche Kunde von Russland*, Vol. 14, No. 2, pp. 309-311.

Anonymous (1855) Malachit-Vorkommen in Ural. *Neues Jahrbuch für Mineralogie, Geognosie, Geologie und Petrefakten-Kunde*, Vol. 23, p. 575.

Anonymous (1856). Malachite. *Scientific American*, Vol. 12, No. 2, p. 16.

Nordenskiöld NAE (1856) Om malachiteens sammansattning och kristallform. *Acta Societatis Scientiarum Fennicae*, Vol. 4, pp. 607-615.

Anonymous (1862) Malachite and works of art. *Scientific American*, Vol. 7, No. 17, pp. 265-266.

Blake W.P. (1868) Notes upon some of the mineralogical curiosities of the Paris Exhibition of 1867. *American Journal of Science*, Vol. 95, No. 134, pp. 194-198.

Von Kokscharow N. (1873) Ueber Afterkrystalle des Malachits aus den Turjinschen Kupfergruben im Ural. *Bulletin de l'Academie Imperiale des Sciences de St-Petersbourg*, Vol. 18, pp. 186-190.

Anonymous (1873). The Demidoffs and the mining industry of the Urals. *Practical Magazine*, Vol. 1, No. 6, pp. 406-409.

Kunz, G.F. (1885). On remarkable copper minerals from Arizona. *Annals of the New York Academy of Sciences*, Vol. 3, pp. 275-278.

Anonymous (1884) Australian malachite. *Journal of the Society of Arts*, Vol. 32, No. 1649, p. 776.

de Schulten A. (1890) Sur la reproduction artificielle de la malachite. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, Vol. 110, No. 4, pp. 202-204.

de Schulten A. (1896) Reproduction artificielle de la malachite par un nouveau procédé. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, Vol. 122, No. 23, pp. 1352-1354.

Hall E. (1896) Note on the origin of malachite. *Engineering and Mining Journal,* Vol. 61, No. 22, pp. 520-522.

Hall E. (1897) Malachite. *Scientific American Supplement*, Vol. 43, No. 1102, pp. 17611-17612.

Valiant W.S. (1897) Malachite. *The Mineral Collector*, Vol. 4, No. 1, pp. 1-4.

Farrington O.C. (1902) Lapis lazuli, amber, and malachite. *Birds and Nature*, Vol. 12, pp. 122-128.

Anonymous (1904). Malachite. *Amateur Naturalist,* Vol. 1, No. 4, pp. 77-78.

Draper, F.W. (1910). Smelting at Nishni Tagil in the Ural Mountains. *Engineering and Mining Journal*, Vol. 90, No. 13, pp. 610-612.

Liesegang R.E. (1915) Von Malachit—Nebst allgemeinen Bermerkungen ueber Pseudomorphosenbildung. *Zeitschrift für Kristallographie und Mineralogie*, Vol. 55, No. 3, pp. 264-270.

Anonymous (1922) Ural and Siberian precious stones and their exploitation. *Jewelers' Circular Magazine*, Vol. 85, No. 18, p. 1.

Behaghel, G. (1923). Die Kupfererzvorkommen im uralischen Bergrevier von Syssertsk. *Zeitschrift für Praktische Geologie*, Vol. 31, No. 4, pp. 33-36.

Brasseur, H. (1932). Contribution to the structure of malachite. Zeitschrift für Kristallographie, *Mineralogie und Petrographie*, Vol. 82, No. 1/2, pp. 111-126.

Hartman R.J., Kanning E.W., Klee F.G. (1934) The Liesegang phenomenon applied to banded malachite. *Journal of Chemical Education*, Vol. 11, No. 6, p. 346.

Remington, P. (1945). The story of a malachite vase. *Metropolitan Museum of Art Bulletin*, Vol. 3, No. 6, pp. 142-145.

Ramsdell L.S., Wolfe C.W. (1950) The unit cell of malachite. *American Mineralogist*, Vol. 35, No. 1/2, pp. 119-121.

Wells A.F. (1951) Malachite: Re-examination of crystal structure. *Acta Crystallographica*, Vol. 4, No. 3, pp. 200-204.

Scaife, J.F. (1957). The solubility of malachite. *Canadian Journal of Chemistry*, Vol. 35, No. 11, pp. 1332-1340.

Webster R. (1958) Marbles and other ornamental stones. *Journal of Gemmology*, Vol. 6, No. 7, pp. 297-333.

Huang C.K., Kerr P.F. (1960) Infrared study of the carbonate minerals. *American Mineralogist*, Vol. 45, No. 3/4, pp. 311-324.

Simpson D.R., Fisher R., Libsch K. (1964) Thermal stability of azurite and malachite. *American Mineralogist*, Vol. 49, No. 7/8, pp. 1111-1114.

Süsse P. (1967) Verfeinerung des kristallstruktur des malachits, $Cu_2(OH)_2CO_3$. *Acta Crystallographica*, Vol. 22, No. 1, pp. 146-151.

Goldsmith, J.A., Ross, S.D. (1968). The infra-red spectra of azurite and malachite. *Spectrochimica Acta A*, Vol. 24, No. 12, pp. 2131-2137.

Solecki R.S. (1969) A copper mineral pendant from Northern Iraq. *Antiquity*, Vol. 43, No. 172, pp. 311-314.

Deliens M., Oosterbosch R., Verbeek T. (1973) Les malachites cobaltifères du Shaba méridional (Zaïre). *Bulletin de la Société Française de Minéralogie et de Cristallographie*, Vol. 96, No. 6, pp. 371-377.

Lakshman S.V.J., Reddy B.J. (1973) Optical absorption spectra of Cu^{2+} in chalcanthite and malachite. *Canadian Mineralogist*, Vol. 12, No. 3, pp. 207-210.

Ruszala, F.A., Kostiner, E. (1974). The hydrothermal synthesis of single crystals of azurite and malachite. *Journal of Crystal Growth*, Vol. 26, No. 1, pp. 155-156.

Gettens R.J., Fitzhugh E.W. (1974) Malachite and green verditer. *Studies in Conservation*, Vol. 19, No. 1, pp. 2-23.

Seguin M.K. (1975) Thermogravimetric and differential thermal analysis of malachite and azurite in inert atmospheres and in air. *Canadian Mineralogist,* Vol. 13, No. 2, pp. 127-132.

Zigan F., Joswig W., Schuster H.D., Mason S.A. (1977) Verfeinerung der Struktur von malachit, Cu2(OH)2CO3 durch neutronenbeugung. *Zeitschrift für Kristallographie, Kristallgeometrie, Kristallphysik, Kristallchemie*, Vol. 145, No. 5/6, pp. 412-426.

Smith A.W. (1978) Stable carbon and oxygen isotope ratios of malachite from the patinas of ancient bronze objects. *Archaeometry*, Vol. 20, No. 2, pp. 123-133.

Dasgupta, D.R., & Guha, R. (1978). Oriented transformation of malachite into tenorite. Zeitschrift für Kristallographie, Vol. 147, No. 1/2, pp. 13-20.

Zeitner, J.C. (1980). More soft stones for lapidaries. *Lapidary Journal*, Vol. 34, No. 7, pp. 1452-1464.

Brandstätter, F., Seeman, R. (1983) "Malachit-Excentriques" auf Kupfervererzungen in palaozoischen Gesteinsserien Karntens und Tirols. *Annalen des Naturhistorischen Museums in Wien*, Vol. 85, pp. 85-92.

Brown I.W.M., Mackenzie K.J.D., Gainsford G.J. (1984) Thermal decomposition of the basic copper carbonates malachite and azurite. *Thermochimica Acta*, Vol. 75, No. 1/2, pp. 23-32.

Geffroy B., Diallo I., Paulin R. (1984) Défauts de structure dans la malachite révélés par annihilation de positons. *Bulletin de la Société Francaise de Mineralogie,* Vol. 107, No. 6, pp. 795-798.

Guineau B. (1984) Analyse non destructive des pigments par microsonde Raman laser: Exemples de l'azurite et de la malachite. *Studies in Conservation*, Vol. 29, No. 1, pp. 35-41.

Symes, J.L., Kester, D.R. (1984). Thermodynamic stability studies of the basic copper carbonate mineral, malachite. *Geochimica et Cosmochimica Acta*, Vol. 48, No. 11, pp. 2219-2229.

Hemachandran K. Chetal A.R. (1986) X-ray K-absorption study of copper in malachite mineral. *Physica Status Solidi B*, Vol. 136, No. 1, pp. 181-185.

Woods T.L., Garrels R.M. (1986) Phase relations of some cupric hydroxy minerals. *Economic Geology*, Vol. 81, No. 8, pp. 1989-2007.

Vink B.W. (1986) Stability relations of malachite and azurite. *Mineralogical Magazine,* Vol. 50, No. 355, pp. 41-47.

Balitsky V.S., Bublikova T.M., Sorokina S.L., Balitskaya L.V., Shteinberg A.S. (1987) Man-made jewelry malachite. *Gems & Gemology*, Vol. 23, No. 3, pp. 152-157.

Balitsky V.S., Bublikova T.M., Sorokina S.L., Balitskaya L.V., Shteynberg A.S. (1987) Synthetic jewelry-grade and ornamental malachite. *Doklady Akademia Nauk SSSR*, Vol. 297, No. 1, pp. 184-186.

Graedel T.E., Nassau K., Franey J.P., Davis M.E., Gallagher P.K., Miller A.E., Opila R.L., Muller A.J., McCorory-Joy C., Hawkins D.T. (1987) Corrosion science. *Journal of the Institution of Corrosion Science and Technology and Cebelcor*, Vol. 27, No. 7, pp. 639-783.

Roper, D.C. (1988). Malachite and turquoise artifacts from Upper Republican sites in Nebraska. *Plains Anthropologist,* Vol. 33, No. 122, pp. 531-534.

Koivula, J.I., Kammerling, R.C. (1988). Plastic imitations of lapis lazuli and malachite. *Gems & Gemology,* Vol. 24, No. 2, p. 123.

Koivula, J.I., Kammerling, R.C. (1989) "Reconstructed" azurite-malachite. *Gems & Gemology,* Vol. 25, No. 1, p. 51.

Zeitner, J.C. (1990). Gems of antiquity. *Lapidary Journal*, Vol. 44, No. 5, pp. 22-27.

Bancroft, P. (1991). Journey to the Urals. *Lapidary Journal,* Vol. 44, No. 12, pp. 50-64.

Lhoest J.J., Gauthier G.J., King V.T. (1991) The Mashamba West mine Shaba, Zaire. *Mineralogical Record*, Vol. 22, No. 1, pp. 13-20.

White, J.S. (1991). Chemistry or crystal size? *Lapidary Journal*, Vol. 45, No. 7, pp. 32-38.

Balitsky V.S., Bublikova T.M. (1991) Physico-chemical foundations of malachite synthesis and structural-morphological peculiarities and properties of its man-made jewelry quality varieties. *Progress in Crystal*

Growth and Characterization of Materials, Vol. 21, No. 1/4, pp. 139-161.

North R.M. (1991) Azurite and malachite from the Morenci and Metcalf mines, Greenlee County, Arizona. *Mineralogical Record*, Vol. 22, No. 1, pp. 66-67.

Collyer T., Rodrigues E.G., Machado J.I.L. (1991) Das Malachitvorkommen der Serra Verde, Curionopolis, Para, Brasilien. *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, Vol. 40, No. 2/3, pp. 99-102.

Ribbe P.H., Eriksson S.C. (1991) Azurite and malachite: Chemically and structurally related minerals. *Mineralogical Record*, Vol. 22, No. 1, pp. 65-66.

Tanaka H., Yamane M. (1992) Preparation and thermal analysis of synthetic malachite, $CuCO_3.Cu(OH)_2$. *Journal of Thermal Analysis*, Vol. 38, No. 4, pp. 627-634.

Kiseleva I.A., Ogorodova L.P., Melchakova L.V., Bisengalieva M.R., Becturganov N.S. (1992) Thermodynamic properties of copper carbonates—malachite $Cu_2(OH)_2CO_3$ and azurite $Cu_3(OH)_2(CO_3)_2$. *Physics and Chemistry of Minerals,* Vol. 19, No. 5, pp. 322-333.

Bennett, D. (1992). Imitation lapis lazuli, charoite, and azurite-malachite. *Australian Gemmologist*, Vol. 18, No. 3, pp. 83-85.

Schmidt M., Lutz H.D. (1993) Hydrogen bonding in basic copper salts: A spectroscopic study of malachite, $Cu_2(OH)_2CO_3$, and brochantite, $Cu_4(OH)_6SO_4$. *Physics and Chemistry of Minerals*, Vol. 20, No. 1, pp. 27-32.

Henn U., Schneider B. (1994) Azurit-Malachit - Verwechslungsmoglichkeiten und Imitationen. *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, Vol. 43, No. 3/4, pp. 127-132.

Kammerling R.C., Fryer C. (1994) Spotted malachite, imitation and natural. *Gems & Gemology*, Vol. 30, No. 4, pp. 267-268.

Ilin O.V. (1994) On the morphology of malachite. *World of Stones*, No. 4, pp. 3-9.

Koivula, J.I., & Fritsch, E. (1995). Impregnated malachite. *Gems & Gemology*, Vol. 31, No. 3, p. 213.

Jones B. (1996) Mineral masterpieces of Russia. *Rock & Gem*, Vol. 26, No. 8, pp. 54-62.

Hadfield, M. (1996). Das Malachit-Problem. *Chemkon*, Vol. 3, No. 4, pp. 172-175.

Astilleros J.M., Pina C.M., Fernández-Diaz L., López-Andrés S. (1998) Malachite crystallization in a diffusing-reacting system. *Crystal Research and Technology*, Vol. 33, No. 1, pp. 51-57.

Wight Q. (1998) The curly malachite of Schwaz-Brixlegg, Tyrol, Austria: New find from a 5000-year-old locality. *Rocks & Minerals*, Vol. 73, No. 5, pp. 314-318.

Budak G., Karabulut A. (1999) X-ray fluorescence analysis of malachite ore concentrates in the Narman region. **Spectrochimica Acta B,** Vol. 54, No. 6, pp. 985-988.

Melchiorre E.B., Criss R.E., Rose T.P. (1999) Oxygen and carbon isotope study of natural and synthetic malachite. *Economic Geology*, Vol. 94, No. 2, pp. 245-259.

Koga N., Criado J.M., Tanaka H. (1999) Apparent kinetic behavior of the thermal decomposition of synthetic malachite. *Thermochimica Acta*, Vol. 340/341, pp. 387-394.

Koga N., Criado J.M., Tanaka H. (2000) Kinetic analysis of the thermal decomposition of synthetic malachite by CRTA. *Journal of Thermal Analysis and Calorimetry*, Vol. 60, No. 3, pp. 943-954.

Shmakin B.M. (2001) Twelve famous gemstones of the Urals. *Proceedings of the Russian Mineralogical Society* Vol. 130, No. 3, pp. 123-125.

Cook R.B. (2001) Connoisseur's Choice: Malachite - Shaba Region, Democratic Republic of Congo. *Rocks & Minerals,* Vol. 76, No. 5, pp. 326-330.

Ata O.N., Colak S., Ekinci Z., Copur M. (2001) Determination of the optimum conditions for leaching of malachite ore in H2SO4 solutions. *Chemical Engineering and Technology*, Vol. 24, No. 4, pp. 409-413.

King R.J. (2001) Minerals explained 33—Azurite and malachite. *Geology Today,* Vol. 17, No. 4, pp. 152-156.

Preis W., Gamsjäger H. (2002) Solid-solute phase equilibria in aqueous systems, XVI: Thermodynamic properties of malachite and azurite—Predominance diagrams for the system Cu^{2+}-H_2O-CO_2. *Journal of Chemical Thermodynamics*, Vol. 34, No. 5, pp. 631-650.

Stoilova D., Koleva V., Vassileva V. (2002) Infrared study of some synthetic phases of malachite ($Cu_2(OH)_2CO_3$) - hydrozincite ($Zn_5(OH)_6(CO_3)_2$) series. *Spectrochimica Acta A*, Vol. 58, No. 9, pp. 2051-2059.

Martens W.N., Rintoul L., Ding Z., Frost R.L., Kloprogge J.T. (2002) Raman spectroscopy of the basic copper carbonates azurite and

malachite. *18th International Conference on Raman Spectroscopy*, pp. 829-830.

Fedorov A.V. (2002) Oh, these imitations again (in Russian). *Gemmological Bulletin*, Vol. 4, No. 7, pp. 37-43.

Frost R.L., Ding Z., Kloprogge J.T., Martens W.N. (2002) Thermal stability of azurite and malachite in relation to the formation of mediaeval glass and glazes. *Thermochimica Acta*, Vol. 390, No. 1/2, pp. 133-144.

Frost R.L., Martens W.N., Rintoul L., Mahmutagic E., Kloprogge J.T. (2002) Raman spectroscopic study of azurite and malachite at 298 and 77 K. *Journal of Raman Spectroscopy*, Vol. 33, No. 4, pp. 252-259.

Melchiorre E.B., Enders M.S. (2003) Stable isotope geochemistry of copper carbonates at the Northwest Extension Deposit, Morenci District, Arizona: Implications for conditions of supergene oxidation and related mineralization. *Economic Geology*, Vol. 98, No. 3, pp. 607-621.

Chernenko T.V., Melnikov E.P. (2003) Properties and diagnostics of natural and synthetic malachite (in Russian). *Gemmological Bulletin*, No. 8, pp. 11-27 and No. 9, pp. 31-35.

Johnson C.E., Yee G.T., Eddleton J.E. (2004) Copper metal from malachite circa 4000 B.C.E. *Journal of Chemical Education*, Vol. 81, No. 1/2, pp. 1777-1779.

Bingöl D., Canbazoğlu M. (2004) Dissolution kinetics of malachite in sulfuric acid. *Hydrometallurgy,* Vol. 72, No. 1/2, pp. 159-165.

Xu J.S., Xue D.F. (2005) Fabrication of malachite with a hierarchical sphere-like architecture. *Journal of Physical Chemistry B,* Vol. 109, pp. 17157-17161.

Helle S., Kelm U. (2005) Experimental leaching of atacamite, chrysocolla, and malachite: Relationship between copper retention and cation exchange capacity. *Hydrometallurgy*, Vol. 78, No. 3/4, pp. 180-186.

Nishimura R., Ide-Ektessabi A. (2007) The relation between fine structural change and color fading in the natural mineral pigments azurite and malachite. *Proceedings of the Materials Research Society,* Vol. 1047.

Eggert, G. (2007). Pseudomorph or corrosion? The enigma of curly malachite. *Metal 2007: When Archaeometry and Conservation Meet*, Vol. 1, pp. 57-60.

Castro K., Sarmiento A., Martinez-Arkarazo I., Madariaga J.M., Fernandez L.A. (2008) Green Copper Pigments biodegradation in cultural heritage: From Malachite to moolooite – Thermodynamic modeling, X-ray fluorescence, and Raman evidence. *Analytical Chemistry*, Vol. 80, No. 11, pp. 4103-4110

Roberts S., Palmer M.R., Matthewman J.C., Buchaus P., Sargent D. (2009) REE and Sr isotope characteristics of carbonate within the Cu-Co mineralized sedimentary sequence of the Nchanga Mine, Zambian Copperbelt. *Mineralium Deposita*, Vol. 44, No. 8, pp. 881-891.

Liu Y.X., Qin S., Li H.J., Li X.D., Li Y.C., Liu J. (2009) High-pressure behavior of copper carbonate: Data from malachite. *Acta Geologica Sinica,* Vol. 83, No. 3, pp. 615-617.

Kampunzu A.B., Cailteux J.L.H., Kamona A.F., Intiomale M.M., Melcher F. (2009) Sediment-hosted Zn–Pb–Cu deposits in the Central African Copperbelt. *Ore Geology Reviews,* Vol. 35, No. 3/4, pp. 263-297.

Behrens M., Girgsdies F., Trunschke A., Schlögl R. (2009) Minerals as model compounds for Cu/ZnO catalyst precursors: Structural and thermal properties and IR spectra of mineral and synthetic (zincian) malachite, rosasite, and aurichalcite and a catalyst precursor mixture. *European Journal of Inorganic Chemistry*, No. 10, pp. 1347-1357.

Behrens M., Girgsdies F. (2010) Structural effects of Cu/Zn substitution in the malachite-rosasite system. *Zeitschrift für Anorganische und Allgemeine Chemie*, Vol. 636, No. 6, pp. 919-927.

El Desouky H.A., Muchez P., Boyce A.J., Schneider J., Cailteux J.L.H., Dewaele S., von Quadt A. (2010) Genesis of sediment-hosted stratiform copper-cobalt mineralization at Luiswishi and Kamoto, Katanga Copperbelt (Democratic Republic of Congo). *Mineralium Deposita*, Vol. 45, No. 8, pp. 735-763.

Decree S., Deloule E., Ruffet G., Dewaele S., Mees F., Marignac C., Yans J., de Putter T. (2010) Geodynamic and climate controls in the formation of Mio-Pliocene world-class oxidized cobalt and manganese ores in the Katanga province, DR Congo. *Mineralium Deposita,* Vol. 45, No. 7, pp. 621-629.

Kostov R. (2010) Gem minerals and materials from the Neolithic and Chalcolithic periods in Bulgaria and their impact on the history of gemology. *Geologica Balcanica*, Vol. 39, No. 1/2, pp. 205-206.

de Putter T., Mees F., Decree S., Dewaele S. (2010) Malachite, an indicator of major Pliocene Cu remobilization in a karstic environment (Katanga, Democratic Republic of Congo). *Ore Geology Reviews,* Vol. 38, No. 1/2, pp. 90-100.

Cho H.G., Seo H.M., Kim S.O., Kim Y.H., Kim S.B. (2010) Mineralogy of Cu-Co Ores from Democratic Republic of Congo. *Journal of the Mineralogical Society of Korea,* Vol. 23, No. 4, pp. 305-313.

Choudhary G. (2010) A chatoyant malachite. *Australian Gemmologist,* Vol. 24, No. 2, pp. 46-47.

Choudhary, G. (2011). Composite malachite plates. *Gems and Jewellery*, Vol. 20, No. 3, pp. 3-5.

Solomon S.D., Rutkowsky S.A., Mahon M.L., Halpern E.M. (2011) Synthesis of copper pigments, malachite, and verdigris: Making tempera paint. J*ournal of Chemical Education*, Vol. 88, No. 1/2, pp. 1694-1697.

Jones B. (2011) Banded ornamental gemstones. *Rock and Gem,* Vol. 41, No. 6, pp. 30-33.

Grant Y.V. (2011) *"Russian mosaic" and its Italian connection: Malachite in the decorative arts in the 1780s-1800s*. MSc Thesis, Corcoran College of Art & Design, Department of History of Decorative Arts, 225 pp.

Haest M., Muchez P. (2011) Stratiform and vein-type deposits in the Pan-African orogen in Central and Southern Africa: Evidence for multiphase mineralization. *Geologica Belgica*, Vol. 14, No. 1/2, pp. 23-44.

Behera P.R., Dash B., Sen P.K., Subbaiah T., Paramguru R.K. (2011) Studies on characterization and leaching of malachite ore. IUP *Journal of Chemical Engineering*, Vol. 3, No. 3, pp. 51-61.

Bissengaliyeva M.R., Gogol D.B., Bekturganov N.S. (2011) Low-temperature measurements of the heat capacity and thermodynamic functions of pseudo-malachite Cu5(PO4)2(OH)4. *Thermochimica Acta,* Vol. 532, pp. 139-144.

Girgsdies, F., Behrens, H. (2012). On the structural relations of malachite, I: The rosasite and ludwigite structure families. Acta Crystallographica B, Vol. 68, No. 2, pp. 107-117.

Girgsdies, F., Behrens, H. (2012). On the structural relations of malachite, II: The brochantite MDO polytypes. *Acta Crystallographica B,* Vol. 68, No. 6, pp. 571-577.

Merlini M., Perchiazzi N., Hanfland M., Bossak A. (2012) Phase transition at high pressure in $Cu_3CO_3(OH)_2$ related to the reduction of the Jahn-Teller effect. *Acta Crystallographica B*, Vol. 68, No. 3, pp. 266-274.

Mees F., de Putter T., Decree S., Dewaele S. (2012) Petrographical features of malachite from Katanga as indicators of mineral formation processes - Preliminary results. *4th International Geologica Belgica Meeting*.

Yu B.S., Fang J.N., Huang E.P. (2013) Characteristics of the Raman spectra of archaeological malachite. *Journal of Raman Spectroscopy*, Vol. 44, No. 4, pp. 630-636.

Renfro, N. (2013). Gem News International: Unusual epigenetic malachite disks in quartz. *Gems & Gemology*, Vol. 49, No. 3, pp. 178-179.

Petrov T.G., Protopopov E.N., Shutskiy A.V. (2013) Decorative grown malachite: Nature and technology. *Russian Journal of Earth Sciences,* Vol. 13, No. 2, pp. 1-7.

Bowell R.J., Ermolina O., van der Plas W., van Us J., Steiner M. (2013) Minerals of the Kaokoveld District, Kuene Region, Namibia. *Mineralogical Record*, Vol. 44, No. 5, pp. 485-504.

Melchiorre E.B., Huss G.R., Lopez A. (2014) Carbon and hydrogen stable isotope microanalysis and data correction for rare carbonate minerals: Case studies for stichtite (Mg6Cr2[(OH)16CO3].H2O) and malachite (Cu2CO3(OH)2). *Chemical Geology*, Vol. 367, No. 63-69.

Spec T., Retko K., Ropret P., Meden A., Bernard J. (2014) The influence of UV-Vis radiation and oscillations of temperature and relative humidity on malachite alteration in the presence of different organic binders and varnishes. *Journal of Raman Spectroscopy*, Vol. 45, No. 11/12, pp. 1068-1075.

Popov V.A., Popova V.I., Blinov I.A., Ponomarev V.S. (2015) Minerals of the Mednorudyanskoe Deposit, Russia. *Mineralogical Almanac,* Vol. 20, No. 3, pp. 1-128.

Han K., Nam J.Y., Ji J.E., Kang, D.I., Lee H.Y., Baek N.Y., Song Y., Yang I.S. (2016) Existence of nanoparticles in azurite and malachite pigments—Raman spectroscopy and X-ray diffraction studies. *Dyes and Pigments*, Vol. 133, pp. 232-237.

Nienhuis J., Robbiola L., Giuliani R., Joosten I., Huisman H., van Os B., Sietsma J. (2016) Curly malachite on archaeological bronze: A systematic study of the shape and phenomenological approach of its formation mechanism. *e-Preservation Science*, Vol. 13, pp. 23-32.

Horton E., Montgomery R., Wilkinson M. (2017) Allergic contact dermatitis caused by copper in a malachite necklace. *Contact Dermatitis*, Vol. 77, No. 2, pp. 120-121.

Serras-Herman, H. (2017). Natural versus Enhanced: Navigating Lapidary Materials. *Gems and Jewellery,* Vol. 26, No. 1, pp. 14-17.

Hyrsl, J. (2017). Gem News International: New azurite-malachite mixture from Peru. *Gems & Gemology*, Vol. 53, No. 4, pp. 475-476.

do Sameiro-Barroso M. (2017) Malachite, the healing gem of green nature. Vesalius: *Acta Internationales Historiae Medicinae*, Vol. 23, No. 1, pp. 99-107.

Kang Y.S., Mun S.W., Park J.H., Jeong H.Y. (2018) The characterization of natural inorganic pigment made of malachite and azurite. *Journal of the Mineralogical Society of Korea*, Vol. 31, No. 4, pp. 249-256.

Do J.Y. (2018) Mineralogical characteristics and provenance of Cu-bearing green minerals used as traditional pigments. *Journal of the Mineralogical Society of Korea*, Vol. 31, No. 2, pp. 123-135.

Perchiazzi N., Dragone R., Demitri N., Vignola P., Biagioni C. (2018) Incorporation of Co in the rosasite-malachite carbonate group of minerals: Crystal structure studies of kolwezite and synthetic cobaltoan malachites. *European Journal of Mineralogy,* Vol. 30, No. 3, pp. 609-620.

Nicol M.J. (2018) The kinetics of the dissolution of malachite in acid solutions. *Hydrometallurgy*, Vol. 177, pp. 214-217.

Yu L.G., Liao R.Q., Guo J. (2018) Gemmological characteristic of two new malachite imitations. *Journal of Gems and Gemmology,* Vol. 20, No. 2, pp. 47-56.

Budrina L. (2018) Two malachite vases by Yekaterinburg masters in imperial diplomacy. *Quaestio Rossica*, Vol. 6, No. 1, pp. 151-160.

Yu L.G., Liao R.Q., Guo J. (2018) Gemmological characteristic of two new malachite imitations. *Journal of Gems & Gemology*, Vol. 20, No. 2, pp. 47-56.

Bublikova T.M., Balitsky V.S., Khanin D.A., Nekrasov A.N., Setkova T.V. (2019) Features of the internal structure of a synthetic malachite. *Moscow University Geology Bulletin*, Vol. 74, No. 1, pp. 73-80.

Shengo M.L., Kime M.B., Mambwe M.P., Nyembo T.K. (2019) A review of the beneficiation of copper-cobalt-bearing minerals in the

Democratic Republic of Congo. *Journal of Sustainable Mining*, Vol. 18, No. 4, pp. 226-246.

Makovicky E., Merlino S. (2019) Order-disorder twinning in malachite. *Canadian Mineralogist*, Vol. 57, No. 4, pp. 475-488.

Tarawneh K., Alnawafleh H., Yasin I.B. (2020) Mineralogical Studies on Some Selected Semi-Precious Stones from Northeast Jordan. *Natural Resources,* Vol. 11, No. 4, pp. 168-183.

Fontaine L., De Putter T., Bernard A., Decree S., Cailteux J., Wouters J., Yans J. (2020) Complex mineralogical-geochemical sequences and weathering events in the supergene ore of the Cu–Co Luiswishi deposit (Katanga, D.R. Congo). *Journal of African Earth Sciences,* Vol. 161, Art. 103674.

Ngan Q. (2020) Collecting azurite blue and malachite green as curios and medicines in Late Imperial China. *Ming Qing Yanjiu*, Vol. 24, No. 1, pp. 67-102.

Torres-Ruiz, J., Pesquera, A., Gil-Crespo, P.P., Delgado, A. (2020). Exotic Cu-mineralization in Triassic red beds from Navas de San Juan (Jaén, Spain). *Ore Geology Reviews*, Vol. 119, Art. 103399.

Pozo-Antonio J.S., Cardell C., Barral D., Dionisio A., Rivas T. (2020) Effect of an SO_2-rich atmosphere on tempera paint mock-ups. Part 2: Accelerated aging of azurite- and malachite-based paints. *Minerals*, Vol. 10, No. 5, Art. 424.

Papineau D. (2020) Chemically oscillating reactions in the formation of botryoidal malachite. *American Mineralogist*, Vol. 105, No. 4, pp. 447-454.

Wang G.R., Yang H.Y., Liu, Y.Y., Tong L.L., Auwalu A. (2020) Study on the mechanical activation of malachite and the leaching of complex

copper ore in the Luanshya mining area, Zambia. *International Journal of Minerals, Metallurgy and Materials*, Vol. 27, No. 3, pp. 292-300.

Budrina, L. (2020). The role of the documents and published sources in assessment and attribution: The case study of the malachite history. *KnE Social Sciences*, pp. 21-26.

Budrina, L.A. (2020). Fashion for malachite, malachite in fashion. *KnE Social Sciences,* pp. 183-186.

Budina, L. (2021). The strategy of a new material: The Demidoff family and malachite. *Researching Art Markets*, 12 pp.

Gao J., Yuan W.Y., Chen B., Liu Z.X., Su W. (2021) High-pressure phase transformation of carbonate malachite $Cu_2(CO_3)(OH)_2$ driven by $[CuO_6]$ regularization and $[CO_3]$ rotation. *Geoscience Frontiers*, Vol. 12, No. 2, pp. 965-973.

Bonechi, M. (2021). La malachite russa a Firenze. *Rivista Mineralogia Italiana*, Vol. 45, No. 4, pp. 270-272.

Akbudak I.K., Basibuyuk Z., Gurbuz M. (2021) Silicified Woods Consist with Malachite, Azurite, and Hematite in the Middle Eocene Çekerek Formation, Tokat - Turkey. *Lithology and Mineral Resources*, Vol. 54, No. 6, pp. 548-558.

Plumhoff A.M., Mathur R., Milovsky R., Majzlan J. (2021) Fractionation of the copper, oxygen, and hydrogen isotopes between malachite and aqueous phase. *Geochimica et Cosmochimica Acta*, Vol. 300, pp. 246-257.

Mishra G., Govil H., Srivastava P.K. (2021) Identification of malachite and alteration minerals using airborne AVIRIS-NG hyperspectral data. *Quaternary Science Advances*, Vol. 4, Art. 100036.

O'Hanlon, G. (2022). The oldest known green pigment in the world. https://www.naturalpigments.com/artist-materials/oldest-green-pigment-malachite.

Budrina, L. (2022). Malachite networks: The Demidov and Medici Vases-Torchères in the Met. *Metropolitan Museum Journal*, Vol. 57, pp. 148-159.

Southwood M., Cairncross B. (2022) Connoisseur's Choice: Malachite pseudomorphs after azurite—Part 1: Bisbee, Arizona, and Tsumeb, Namibia. *Rocks & Minerals,* Vol. 97, No. 1, pp. 72-83.

Megaw P.K.M., Jones E.A., Cairncross B., Southwood M. (2022) Connoisseur's Choice: Malachite pseudomorphs after azurite—Part 2: Milpillas, Mexico, and Other Worldwide Localities. *Rocks & Minerals*, Vol. 97, No. 6, pp. 534-555.

Feng Q.C., Yang W.H., Wen S.M., Wang H., Zhao W.J., Han G. (2022) Flotation of copper oxide minerals: A review. *International Journal of Mining Science and Technology*, Vol. 32, No. 6, pp. 1351-1364.

Peng I., Hills-Kimball K., Lovelace I.M., Wang J.Y., Rios M., Chen O., Wang L.Q. (2022) Exploring the colors of copper-containing pigments, copper (II) oxide and malachite, and their origins in ceramic glazes. *Colorants*, Vol. 1, No. 4, pp. 376-387.

Sattar, S. (2023). Choosing a malachite pigment. *Journal of Chemical Education*, Vol. 100, No. 10, pp. 4072-4076.

Tzankova N. (2023) LA-ICP-MS study of malachite from copper deposits in the Rosen ore field, Burgas ore district, SE Bulgaria. *Geologica Balcanica*, Vol. 52, No. 1, pp. 3-12.

Zou W.H., Yeo S.Y. (2024) New methods for the identification of malachite pigments with varying particle sizes used in ancient Chinese

murals by spectroscopic techniques. *Dyes and Pigment*s, Vol. 226, Art. 112111.