AMPH-IMA97 - A Hypercard program for amphibole classification and nomenclature based on the 1997 International Mineralogical Association Scheme

Mogessie, A.*, Ettinger, K.*, Leake, B.E. & Tessadri, R.*****
* Institut für Mineralogie-Kristallographie und Petrologie, Universität Graz, Universitätsplatz 2, 8010 Graz
** Department of Earth Sciences, Cardiff University. P.O.Box 914, Cardiff, CF1 3YE, UK
*** Institut für Mineralogie und Petrographie, Universität Innsbruck, Innrain 52, 6020 Innsbruck

The IMA 78 amphibole nomenclature scheme [1] was computerized and shown on a classification chart [2]. Recently the IMA recommended a revised amphibole scheme [3] making it necessary to amend the EMP-AMPH program to the new rules. The AMPH-IMA97 program allows single input or automatic input of as many amphibole analyses as are available following a set input format. There are three options for dealing with each amphibole analysis: 1) wet chemical analyses can be calculated to 24(O,OH,F,Cl); 2) analyses with determined FeO and Fe_2O_3 but without H_2O can be calculated to 23(O) and 3) electron microprobe analyses calculated to 23(O) with IMA 97-recommended normalisation for Fe^{2+} and Fe^{3+} values. Deer, Howie and Zussman's listing of over 500 analyses [4] have been typed into an Excel sheet, automatically imported and calculated by the three above options, in order to test the program. The first comprehensive test of the third option shows it to be very successful for estimating Fe^{2+} ($R^2 = 0.88$) but less successful for Fe^{3+} ($R^2 = 0.42$). Problems in the normalisation of electron microprobe analyses of sodic amphiboles for Mn^{2+} - Mn^{3+} and Fe^{2+} - Fe^{3+} emerged and because Mn^{3+} is a classifying parameter, the program has been modified for sodic amphiboles.
The program is accompanied by a new coloured amphibole classification chart.

Literature:
[1] Leake, B. E. (1978): Nomenclature of amphiboles, Mineral. Mag. 42: 533 - 563.
[2] Mogessie, A., Tessadri, R. & Veltman, C. B. (1990): EMP-AMPH - A Hypercard program to determine the name of an amphibole from electron microprobe analysis according to the International Mineralogical Association Scheme. Computers & Geosciences. 16: 309-330.
[3] Leake et al. (1997): Nomenclature of Amphiboles: Report of the Subcommittee on Amphiboles of the International Mineralogical Association Commission on New Minerals and Mineral Names. Mineral. Mag. 61: 295-321.
[4] Deer, W.A., Howie, R. A. & Zussman, J. (1997): Double chain silicates. The Geological Society, London. 2B: 1-764.

Mineralogical aspects concerning the improvement of the critical current density of Ag-clad BPSCCO high T_c superconducting multifilamentary tapes

Neubauer, J., Risch, A. & Göbbels, M.
Institut für Geologie und Mineralogie, Lehrstuhl für Mineralogie, Schloßgarten 5a, 91054 Erlangen
neubauer@geol.uni-erlangen.de

Industrial applications of the high T_c superconductors discovered since 1986 [1] have emphasized the importance of the Bi-Pb-Sr-Ca-Cu-O system. Precursors with a chemical composition within this system, containing mainly Bi(Pb)-2212 and additional phases, are used to produce highly pure Bi(Pb)-2223 multifilamentary tapes by the powder-in-tube (PIT) technique [2]. Phase assemblage and microstructure in such superconducting tapes are responsible – aong others – for the critical current density J_c. But there is still a lack of suitable characterization tools for these attributes.
X-ray diffraction analysis combined with Rietveld refinement [3] was applied to fully processed Bi(Pb)-2223 multifilamentary tapes for quality control purposes. Reietveld refinement offers new possibilities for accurate quantitative phase analysis, description of preferred orientation and determination of crystallite size by X-ray powder diffraction within a few minutes.
Phase content of the Bi(Pb)-2223 and additional phases in fully processed tapes was investigated in dependance of various sintering times, temperatures and oxygen partial pressures. Additionally the degree of texture of the Bi(Pb)-2223 phase was evaluated by calculating the Lodgering factor with all observed intensities determined by Rietveld refinement. Influence of the crystallite size on the superconducting properties can be extracted from FWHM parameter.

Literature:
[1] Bednorz, J.G. & Müller, K.A. (1986): Possible High T_c superconductivity in the Ba-Cu-O system. - Z. Phys. B - Condensed Matter, 64, 189-193.
[2] Sandhage, K.H. Riley, G.N. & Carter, W. (1991): Critical Issues in the OPIT Processing of High J_c BSCCO Superconductors. - J. Metals, 43, 21.
[3] Rietveld, H.M. (1969): A profile refinement method for nuclear and magnetic structures. - J. Appl. Cryst., 2, 65.