

**"SEM" MINERALOGICAL  
CONSTRAINTS AND  
PSEUDOMORPHOSIS OF THE  
ALKALI FELDSPAR INTO  
BIOTITE: HYDROTHERMAL  
PROCESSES IN THE NANA  
COMPLEX GRANITES  
(CAMEROON, CENTRAL AFRICA).**

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The Nana alkaline complex is situated in the Tikar plain, the Central part of the Cameroon Line (CL) in Central Africa. It is a plutonic–volcanic complex where granitic rocks widely dominate over other plutonic and volcanic ones. The petrography of granites under optical microscope and Scanning Electron Microprobe (SEM) shows mineralogical evidence of hydrothermal processes. These granites display granophyric and micrographic textures. They have been affected by the common alkali feldspar alterations (albitization and argillization) processes known to be associated to the late– to post–magmatic stages of alkaline rocks. For the first time in the CL, an unusual transformation process, marked by the partial to total replacement of alkali feldspar by biotite of annite and silicic annite composition ( $X_{Fe} = 1$  ;  $Si = 5.6 - 6.7$  apfu..) has been shown. To explain its feasibility, the following reaction has been proposed :  $KAlSi_3O_8$  (sanidine) +  $Fe_3O_4$  (magnetite) +  $H_2O$  (gas) =  $KFe_3AlSi_3O_{10}(OH)_2$  (annite) +  $1/2O_2$  (oxygen). The above characteristics added to i) the low range variation of  $SiO_2$  (74–76 ppm) that contrasts with the large range variation of their HFSE (Y: 36.2–1540 ppm, Zr: 181–1070 ppm) and LREE (La: 58–2210 ppm ; Ce: 90–2114 ppm ; Nd: 41–1810 ppm); ii) the high content of  $Fe_2O_3$  (up to 14.5 wt.% in a biotite granite NA225) in some alkali feldspar analyses ; and iii) the accessory minerals (apatite, zircon, monazite, fluorite and other REE-minerals) filling microcracks of preexisting magmatic minerals, are consistent with the major role played by fluids circulation in the

study granites. Based mainly on the feldspar alteration features and quantitative analyses of accessory minerals and newly formed biotite, we found that the circulating fluids were made up at least of  $OH^-$ ,  $Cl^-$ ,  $F^-$  and  $SO_4^{2-}$  as ligands whereas the elements transported included : Zn, Zr, P, Y,  $CO_2$ , REE (La, Ce, Nd)... We attribute the presence of Cl and F to the chloride and fluorite salt composition of the circulating fluids. Isotopic and fluid inclusions studies will better precise the nature of origin of the circulating fluid.