

Development of cathodoluminescence geodosimeter: the relationship between He⁺ ion dose density and CL color for natural quartz

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Cathodoluminescence (CL) measurement of radiation damage halos after He⁺ implantation with a dose density from 7.5×10^{-7} C/cm² to 1.3×10^{-3} C/cm² were carried out for natural quartz samples from Inada, Toki (granite), Miyamori, Hanazonoyama, Yamanoo, Naegi (pegmatite), Arakawa, Takatori, Otome, Suisyo-toge, Akatsuki, Minas Gerais (hydrothermal vein), Inaichi (volcanic rock), Besshi (metamorphic rock), Herkimer (diagenesis) and Kanyemba (sandstone). In all samples bright CL halos of about 14 μ m in width from the implantation surface are recognized. It is noted that CL colour continuously changes with dose density, demonstrating that it is possible to use the CL halo as a new dosimeter that is useful for dating and analysis of radionuclide migration in natural geological media.