Potential of single grain laser fusion K-Ar dating: A trial

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Laser fusion noble gas isotope measurements for single grains of phenocrysts were tried for *in situ* K-Ar dating method. For such samples as single grains, Ar-Ar dating is applied widely to obtain radiometric ages. The Ar-Ar method is insensitive to the sample heterogeneities as in the heterogeneous distributions between K and Ar in the specimen. However, Ar-Ar dating at least raises difficulties that the nuclides produced by irradiation mask some of the original isotope ratios in rock and mineral samples, which discard any estimation of initial isotope compositions. In the cases of small amount of radiogenic ^{40}Ar, large uncertainties propagated from those of initial ratios makes the calculated ages useless. Herein, we report an un-irradiated and un-spiked laser fusion K-Ar dating trial, with which we can analyze both Ar and K for the individual grains. The K measurements followed laser fusion Ar measurements applied to the retrieved single mineral grains themselves. This achieved by the ultra-low blank K-measurements using an optimized atomic adsorption apparatus with double-beam polarized Zeeman method for background correction (Hitachi Z-5010). The deuterium lump and the polarized Zeeman method suppress background signals in atomic absorption photometry. Its new optical system and the improved graphite furnace ensure high sensitivities in clean room laboratory (class 1000). This method presumably enables us to acquire precise radiometric ages of single grain K-Ar dating, which applicable to hydrothermally precipitated veins, e.g. plagioclases, quartz and/or amphiboles.

Water quality	Conductivity range (S/m)
Excellent quality	5.5 x 10^{-5} to 0.046
Good quality	0.046 to 0.141
Poor quality	0.141 to 0.188

Mathematical model of online water pollution monitor

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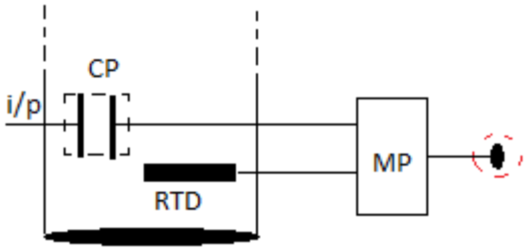
Mathematical analysis

The principle of working of conducting plates is used in the paper. When the conducting plates are ON, the conducting media, water conducts, and the different ions present in the water are responsible for conductivity.

The model can be divided into three basic parts:

- Conducting plates, RTD and a Controller.



The basic equations related to resistivity are given by

$$R = \frac{\rho \times D}{A} \qquad \sigma = 1 \div \rho$$

Here, temperature is a constraint as conductivity depends on it.

$$\rho_T = \rho_0[1 + \alpha(T - T_0)]$$

Hence RTD is used for temperature sensing and thus equivalent voltage is obtained. The equation of temperature sensor is

$$R_T = R_0(1 + AT + BT^2)$$ A, B are constants.

The voltages obtained are given to the controller which on processing; using this analysis gives the required result.

Table 1: The conductivities of water at different qualities.

Water quality	Conductivity range (S/m)
Excellent quality	5.5 x 10^{-5} to 0.046
Good quality	0.046 to 0.141
Poor quality	0.141 to 0.188

Discussion of results

From the table given above, the quality of water is decided based on the conductivity values. The quality poor imply that, by consuming water of this quality for a considerable period of time it may cause health problems [1], [2]. Thus the water quality is being observed periodically to avoid health hazards.

[1] http://www.laleva.cc/environment/water.html
[2] http://www.who.int/household_water/en/