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Monitoring and modelling of handmade jellified non-polarizing copper sulphate electrodes signal for SIP measurements

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Providing non-polarizable electrodes that are well suited for different kind of SIP measurements (various sample holder, sizes or materials) is still an issue at present time. Thus, the aim of this study is twofold: 1/ to provide reliable and stable handmade non-polarizable electrodes
and 2/ to model the electrode induced signal (if there is one) on the SIP measurements. In order to evaluate the possibility to manufacture reliable and stable non-polarizable electrodes, we jellified our electrodes in order to avoid copper sulfate leakage, and monitored them for 120 days with 4 quality criteria (Kemna, 2014; Kaouane, 2016): i) the difference of potential between the electrodes in saturated copper sulphate solution, which should be stable and negligible regarding the
potential developed during SIP measurements, ii) the contact resistance in tap water that should be as low as possible, and iii) the SIP measurement on tap water which should not vary. The temperature has been recorded during the measurement as it can have influence on the measures. The results seem to show that our electrodes are reliable. The difference of potential is stable over two months and lower than 2 mV. The contact resistance is strongly linked to temperature values by a quasi-linear relationship. The values in tap water are around 6-7 k. The SIP measurements on tap water are also stable over at least 2 months. The values of resistivity during the stable period are 25 to 30 W.m and don't seem to be influenced by the temperature. The aim of the modelling part is to be able to understand the influence of the electrodes
versus the global system device/electrodes/sample-holder/material on the SIP measurements. We modelled the influence of the device with pure resistors and the influence of the electrodes on tap water. The modelling takes into account a capacitive component and the permittivity of the water (Abdulsamad et al., 2016). Our preliminary results show that for some sets of electrodes, there is no electrode effect at all. So for good handmade electrodes, they are not inducing any signal.