Dysfunctional hedonic processing is associated with negative affective states and is prevalent in numerous psychiatric illnesses such as addiction and depression. It is important then to help develop potential treatments that can prevent or revert the development of aversive affective states. In animals, affective states can be studied using taste reactivity (TR), in which appetitive and aversive orofacial expressions are studied during the intraoral (IO) infusion of a palatable or aversive solution. Moreover, changes in affective states can be assessed using Conditioned Taste Aversion (CTA), in which the infusion of a palatable saccharin solution is paired with the injection of the malaise-producing agent lithium chloride. After the pairing, rats experience aversiveness towards the previously palatable solution even in the absence of lithium chloride. The infralimbic cortex (IL) and nucleus accumbens shell (NAcSh) are key brain structures involved in hedonic processing, as optogenetic stimulation of this pathway at 20Hz reduced CTA-induced aversive responses. Here, we used TR, CTA, and local field potential electrophysiological recording to test whether transcranial alternating current stimulation (tACS), a form of non-invasive brain stimulation, at 20 Hz, can revert the behavioral and brain changes induced by CTA. We found that the treatment was only effective in a subgroup of rats. Indeed, tACS stimulation improved IL-NAcSh functional connectivity disrupted by CTA in these rats. These results indicate that there are individual differences in susceptibility to tACS treatment, and future studies should assess different tACS parameters (e.g., amplitude, frequency, etc.) that may be effective in all subjects.