P A T E N T C L A I M S

1. An ear plug comprising a shell with at least two electrodes adapted for measuring brain wave signals, said electrodes being connected with means for processing the measured signals, c h a r a c t e r i z e d in that the contours of the outer surface of the ear plug and the electrodes are individually matched to at least part of the ear canal and the concha of the user, wherein the ear plug is made of a dimensionally stable material capable of maintaining a particular shape for identical positioning in the ear canal each time it is inserted.

~~2. An ear plug according to claim 1, wherein the electrodes are individually matched to at least part of the ear canal and the concha of the user.~~

2~~3~~. An ear plug according to claim 1 or 2, wherein the means for processing said measured signals is adapted for delivering a signal to the user.

3~~4~~. An ear plug according to any one of claims 1 to 3, wherein the means for processing is located external to the ear plug.

4~~5~~. An ear plug according to any one of claims 1 to 3, wherein the means for processing is located inside the ear plug.

5~~6~~. An ear plug according to any one of the preceding claims wherein the connecting means comprise a wiring drawn in or through said shell of the ear plug.

6~~7~~. An ear plug according to claim 6, wherein the conductive wiring is arranged to form at least part of one of the electrodes.

7~~8~~. An ear plug according to any one of the preceding claims, wherein the ear plug further comprises a pin or a rivet extending between said electrode and said connecting means through at least a part of said shell of said ear plug in such a way that a part, such as a head, of said pin or rivet is arranged flush with or on said surface of said shell.

8~~9~~. An ear plug according to claim 8, wherein said part, e.g. the head, of said pin or rivet, being arranged flush with or on said surface of said shell is adapted to form or accommodate said at least one electrode.

9~~10~~. An ear plug according to anyone of claims 1 to 7, wherein the ear plug comprises at least one recess in which the at least one electro-

de is mounted, the bottom surface of the recess following the contours of the outer surface of the ear plug.

10~~11~~. An ear plug according to claim 10, wherein the electrode is held in the recess by the electrode comprising at least one of a close fit to the recess, at least one convexity corresponding to at least one concavity provided in the recess and an adhesive.

11~~12~~. An ear plug according to claim 10 or 11, wherein the electrode is made of an electrically conductive flexible material, preferably an electrically conductive silicone.

12~~13~~. An ear plug according to anyone of claims 1 to 11, wherein the electrodes are polarizable electrodes, preferably made of an alloy, such as stainless steel or platinum-iridium, or of a noble metal such as silver, titanium, platinum or tungsten.

13~~14~~. An ear plug according to anyone of claims 1 to 11, wherein the electrodes are non-polarizable electrodes, preferably Ag/AgCl electrodes.

14~~15~~. An ear plug according to anyone of the preceding claims, wherein each of the electrodes covers an area of at least 1 mm^2, preferably between 1 mm^2 and 30 mm^2.

15~~16~~. An ear plug according to any one of the preceding claims, wherein said ear plug is a part of a hearing aid.

16~~17~~. An ear plug according to any one of the preceding claims, wherein the processing of said brain wave signals provides information for detecting a medical condition of the user.

17~~18~~. A system comprising an ear plug and at least one electrode, the ear plug being individually matched to at least part of the ear canal and the concha of the user and made of a dimensionally stable material capable of maintaining a particular shape, the electrode being adapted for measuring brain wave signals and individually matched to at least part of the ear canal and the concha of the user ~~ear plug having at least one electrode for measuring brain wave signals~~ , and a behind-the-ear (BTE) component, where the BTE component accommodates said means for processing the brain wave signals.

18~~19~~. A system according to claim 18, wherein the BTE component comprises at least one electrode for measuring brain wave signals.

19~~20~~. A method of producing an ear plug with surface electrodes for measuring brain wave signals comprising the steps of, tracing the shape of a part of the user's ear canal and concha, converting the traced shape into a digital form such as a three dimensional computer model and building the ear plug based on the computer model by means of a computer controlled production process, wherein at least one electrode is ~~placed~~ individually matched to at least part of the ear canal and the concha of the user~~according to the shape of the user's outer ear~~.