CLAIMS

1. An in-line monitoring device for detecting a material of interest in a mining material, the device including:

a plurality of electrodes including at least a first electrode which is a positive or a negative electrode, and second and third electrodes which are opposite in charge from the first electrode,

the first electrode being separated from the second and third electrodes by a non-conductive space or spaces through which mining material can pass,

the device configured to detect the presence of the material of interest in the mining material as it passes through the space and forms an electrical connection between the first electrode and at least one of the second or third electrodes.

2. The in-line monitoring device of claim 1, wherein the first electrode is configured to form with each of the second and third electrodes a different electrical circuit.

3. The in-line monitoring device of any one of the preceding claims wherein the electrodes are arranged in a stack, with the first electrode being located at a first distance in the stack from the second electrode and at a second distance in the stack from the third electrode, the first distance being less than the second distance.

4. The in-line monitoring device of any one of the preceding claims, wherein the second and third electrode are electrically separated adjacent electrodes.

5. The in-line monitoring device of claim 4, wherein the electrodes are in a stepped arrangement, with the third electrode overhanging the second electrode to form the space, the size and shape of the space configured to minimise entrapment of the material of interest and/or mining material.

6. The in-line monitoring device of any one of the preceding claims, wherein a non-conductive spacer or spacers defines the space or spaces, and the plurality of

electrodes are arranged so as to overlap at least a portion of the non-conductive spacer or spacers, the overlap defining the space or spaces between at least the first electrode and the second and third electrodes.

7. The in-line monitoring device of claim 6, wherein the in-line monitoring device includes a plurality of positive and negative electrodes, the positive and negative electrodes separated from each other by the non-conductive spacers.

8. The in-line monitoring device of claims 6 or 7, wherein the plurality of electrodes are a plurality of conductive plates in stacked relation with each other, the non-conductive spacer being a non-conductive plate located between adjacent conductive plates of opposite charge, and wherein adjacent plates of the same charge are electrically separated.

9. The in-line monitoring device of any one of claims 6 to 8, wherein the non-conductive spacer is a portion of a flow channel through which the mining material is transported.

10. The in-line monitoring device of claim 9, wherein the plurality of electrodes are mounted to an outer wall portion of the flow channel.

11. The in-line monitoring device of any one of the preceding claims, wherein the plurality of electrodes each include an aperture, and the device further includes a non-conductive shaft, the non-conductive shaft extending through the apertures, the plurality of electrodes being mounted to the non-conductive shaft.

12. The in-line monitoring device of any one of the preceding claims, wherein the plurality of electrodes are each formed from a material having a hardness of at least 7 on the Mohs scale.

13. The in-line monitoring device of any one of claims 1 to 11, wherein the plurality of electrodes are each formed from a material having a resilience of about D100 or less as defined in ASTM D22400-00.

14. The in-line monitoring device of any one of the preceding claims, wherein the non-conductive space is formed from a material having a hardness of at least 7 on the Mohs scale.

15. The in-line monitoring device of any one of claim 1 to 13, wherein the non-conductive space is formed from a material having a resilience of about D100 or less as defined in ASTM D22400-00.

16. Use of a device according to any one of the preceding claims in an in-line monitoring process for detecting a material of interest in a mining material.

17. Installation of a device according to any one of claims 1 to 15 in a flow channel for transporting a mining material.

18. A method for in-line monitoring of a mining material to detect a material of interest in the mining material, the method including:

providing a device according to any one of claims 1 to 17 in a flow stream of a mining material; and

using the device to monitor for a material of interest in the mining material.

19. An in-line monitoring process for detecting a material of interest in a mining material, the process including:

providing a device to a flow channel for the mining material, the device including:

a plurality of electrodes including at least three electrodes, a first electrode which is a positive or a negative electrode, and second and third electrodes which are opposite in charge from the first electrode,

the first electrode being separated from the second and third electrodes by a non-conductive space through which mining material can pass,

the device configured to detect the presence of the material of interest in the mining material as it passes through the space and forms an electrical connection between the first electrode and at least one of the second or third electrodes,

transporting the mining material through the flow channel so that at least a portion of the mining material passes through the space; and

monitoring the portion of the mining material for the material of interest.

20. The process of claim 19, wherein the step of monitoring further includes providing an output signal having a value that is indicative of the relative concentration of the material of interest in the mining material, wherein the value of the output signal is compared against a baseline value, and if the output signal is below the baseline value the mining material is discarded, and if the output signal is above the baseline value the mining material is retained.

21. The process of claim 20, wherein the value of the output signal is used to determine a downstream mining process.

22. The process of any one of claims 19 to 21, wherein the device is provided on both an inlet stream to a mining process and an outlet stream from the mining process.

23. The process of claim 22, wherein the device on the inlet stream provides an inlet signal which is indicative of the relative concentration of the material of interest in the inlet stream, and the device on the outlet stream provides an outlet signal which is indicative of the relative concentration of the material of interest in the outlet stream; wherein the inlet signal and the outlet signal are correlated so as to provide an indication of an efficiency for extraction of the material of interest from the mining material.

24. The process of claims 22 or 23 wherein the inlet stream to the mining process is at a location near to an extraction site of mining material, and the outlet stream from the mining process is at a processing site where the material of interest can be extracted from the mining material.