CLAIMS

1. A water extracting device comprising:

a carrier structure;

a substrate of fibrous material provided on the carrier structure, the fibrous material comprising a plurality of individual fibres~~;~~, each of the individual fibres comprising a core and a quantity of an LCST polymer grafted onto an outer surface of the core forming a layer surrounding the core;

~~a quantity of an LCST polymer coating the individual fibres;~~ and

a heating provision arranged to selectively heat the LCST polymer to above its lower critical temperature whereby water absorbed by the fibres can be subsequently released on heating.

2. The device as claimed in claim 1, wherein the carrier structure comprises either a conducting metal foil or an insulating foil.

~~3. The device as claimed in claim 1, wherein the carrier structure comprises an insulating foil.~~

~~4~~3. The device according to any one of the preceding claims, wherein the carrier structure comprises a plurality of fins and the fibrous material is provided on the fins.

~~5~~4. The device according to any one of the preceding claims, wherein the LCST polymer is poly(N -isopropylacrylamide) (PNIPAAm).

~~6~~5. The device according to any one of the preceding claims, wherein the fibres comprise natural fibres, preferably cotton or viscose.

~~7~~6. The device according to any one of the preceding claims, wherein the heating provision comprises a resistive heating element provided on the carrier structure.

~~8~~7. The device according to any one of the preceding claims, wherein the heating element comprises a carbon containing layer, preferably comprising carbon black particles.

~~9~~8. The device according to any one of the preceding claims, wherein the heating element covers regions of the substrate and other regions of the substrate are free of heating elements.

~~10~~9. The device according to any one of the preceding claims, wherein the carrier structure comprises a generally rectangular panel and the heating element comprises strips extending across the panel that can be selectively activated.

~~11~~10. A system comprising a housing having an inlet and an outlet and a device according to any one of the preceding claims located within the housing, whereby air can flow from the inlet to the outlet over the substrate.

~~12~~11. The system according to claim ~~11~~10, wherein the housing further comprises a drain and a gravity flow structure leading to the drain.

~~13~~12. The system according to claim ~~11~~ 10 or claim ~~12~~11, further comprising a heat exchanger communicating with the outlet, whereby air leaving the outlet can flow through the heat exchanger and be cooled.

~~14~~13. A method of extracting entrained water vapour from a fluid stream, comprising:

providing a device according to any one of claims 1 to ~~10~~9, or a system according to any one of claims ~~11~~ 10 to ~~13~~12;

passing a flow of humid air having a temperature below the lower critical temperature over the device whereby the air is in contact with the LCST polymer and the LCST polymer absorbs a quantity of water vapour; and

activating the heating provision to selectively heat the LCST polymer to above its lower critical solution temperature whereby water absorbed on the fibres is released.

~~15~~14. The method as claimed in claim ~~14~~13, further comprising cooling the flow and/or the device to remove the heat of absorption of the vapour.

~~16~~15. The method as claimed in claim ~~14~~ 13 or claim ~~15~~14, further comprising collecting the released water by gravity flow to a drain.

~~17~~16. An LCST laminate comprising: a carrier layer~~,~~; a fibrous material layer, ~~the~~ fibrous material in the fibrous material layer comprising a plurality of individual fibres, each of the individual fibres comprising a core and a quantity of an LCST polymer grafted onto an outer surface of the core forming a layer surrounding the core; ~~and a quantity of an LCST polymer coating the individual fibres,~~ and a resistive heating layer.

~~18~~17. The LCST laminate according to claim ~~17~~16, wherein the laminate is formable into a desired shape, preferably by pressing or moulding.

~~19~~18. The LCST laminate according to claim ~~17~~ 16 or claim ~~18~~17, wherein the laminate is cut and formed into a plurality of fins, partially separated from one another.

~~20~~19. The LCST laminate according to any one of claims ~~17~~ 16 to ~~19~~18, wherein the carrier layer comprises aluminium.

~~21~~20. The LCST laminate according to any one of claims ~~17~~ 16 to ~~20~~19, wherein the resistive heating layer comprises carbon black.