EBSD Investigations in the Micro System Technologies

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Due to high local resolution, the method of materials characterization by means of electron backscattered diffraction (EBSD) has gained much importance for micro system technologies. For instance, thin metallization layers, lead free solder bumps before and after thermal cycling or wire bonding are at the focus of materials investigations. The EBSD method gives a good possibility to observe the changes in materials properties through a phase identification, grain size analysis or determination of the texture. Also elastic strain can be examined with this method. But the strain analysis is a special case of the method and is only used for single crystals.

The special challenge of EBSD investigations in the micro system technologies is the combination of different materials, conductive with non conductive. So not only the sample preparation was more complicated than the normal preparation of cross-section polish but also the stability of the sample position during the scan is a specially task.

The poster shows examples of different investigations. One of them is from an analysis of electro-plated copper foils. Copper has a high profile in micro system technologies applications. While classical X-ray diffraction is capable of producing results on the macro level e.g. regarding preferred orientation, EBSD is also capable of producing results at cross section level with high lateral resolution [1].

The change of grain size and texture of lead-free solder is a further main field of the EBSD investigations. The results of the measurements at solder bumps from two chip size packages (CSP), initial state and after thermal cycling are illustrated.

Furthermore, EBSD was also used to measure local elastic strain and small rotations [2-7]. In the electronic packages the thermal misfit between different phases is influencing the electronic response and package reliability. Therefore, the high resolution strain analysis is becoming more and more importance. First results of strain analysis of metalized Si-Wafers are also presented.

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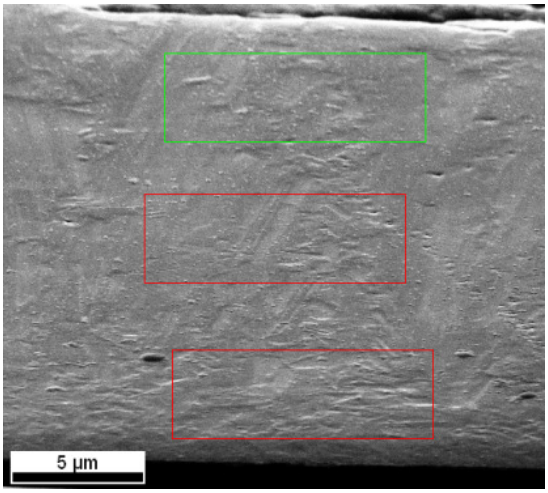

Figure 1. The figure shows the 60 µm copper layer (electrical current density of deposition 3 A/ dm^2), polished for the EBSD measurement. The rectangles mark the measuring area.

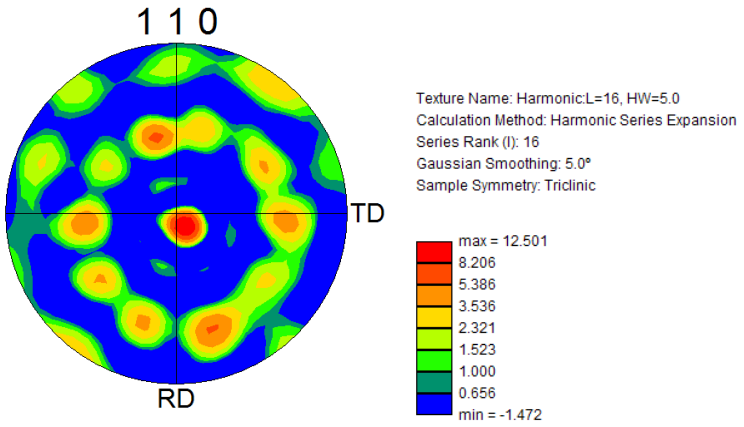

Figure 2. The figure represents the preferred orientation of the upper measuring area.

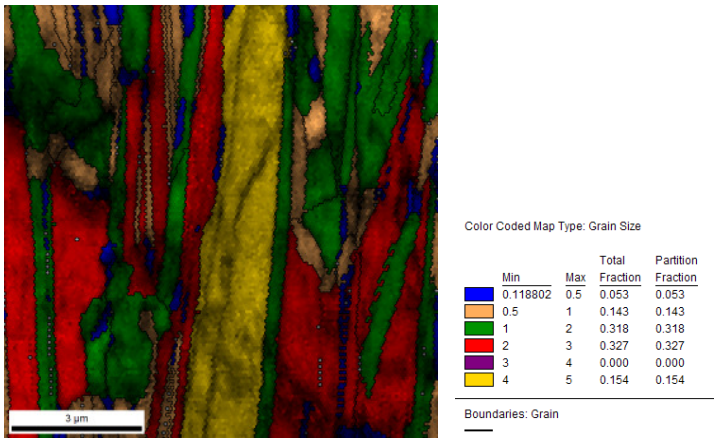

Figure 3. The figure demonstrates the grain size analysis of the same area.

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