Corrigendum on the tensile behaviour of infiltrated alumina particle reinforced aluminium composites

M. Kouzeli, L. Weber, C. San Marchi and A. Mortensen*

Laboratory for Mechanical Metallurgy, École Polytechnique Fédérale de Lausanne, 1015 Lausanne, Switzerland

* Currently at Sandia National Laboratories, Livermore CA 94551

Received 4 June 2003; accepted 21 June 2003

Abstract

The purpose of this note is to correct two errors, which were present in the manuscripts of two articles published by ourselves in Acta Materialia and are not printer’s errors.

In Ref. [1], in-situ matrix flow curves were derived from composite curves using a formula given by Nan and Clarke in Ref. [2]. We have, since publication of Ref. [1], found that there is a typographical error in one of the equations of the Nan-Clarke model: the exponent in the numerator of Eq. (6) in Ref. [2], should read \((1-n)/n\), instead of \(n/(1-n)\). This error is, incidentally, also present in other publications by Nan and Clarke, e.g., Eq. (12) of Ref. [3].

Using the correct formula yields matrix flow stresses given in Fig. 1, which replaces Fig. 5 of Ref. [1]. For all composites of Ref. [1], the difference in the back-calculated matrix in-situ curves is small, being at most 20 MPa at high strain (\(\varepsilon \approx 3\%\)).

The resulting curves for the dislocation density as a function of plastic strain, Fig. 6 of Ref. [1], are replotted here in Fig. 2. Again, the difference is relatively small (around 10% in the value of the dislocation density \(\rho\) at all strains). The resulting modified plots for Figs. 7, 8 and 9 of Ref. [1] are given here in Figs. 3, 4 and 5 respectively.

Overall differences between plots published in Ref. [1] and the present corrected plots are minor. In particular, all observed linearities are maintained:

– between the dislocation density \(\rho\) and the matrix plastic strain in the low-strain regime (Fig. 2),
– between the inverse of the microstructural scale \(1/\lambda\) and \(\rho\) (Fig. 3),
– between the geometrical slip distances \(l_G\) and \(\lambda\) (Fig. 4), and
– between the logarithm of matrix strain and the logarithm of dislocation density \( \rho \) (Fig. 5).

All conclusions of Ref. [1] are thus maintained, the only changes required in the text of Ref. [1] being:

– that the geometric slip distance \( l_G \) is roughly equal to \((1/7.5) \lambda\) (instead of \((1/7) \lambda\)), and
– that the exponent of the power-law dependence of \( \rho_G \) and \( \rho_S \) with strain (Fig. 5) is near 0.4 for both \( \rho_G \) and \( \rho_S \) (instead of 0.4 and 0.45, respectively, in the text of Ref. [1]). The exponents for those two dislocation densities are thus now fully consistent with the observed proportionality with strain to the power \( n = 0.2 \) of both the matrix and composite flow stresses.

The second error that we wish to correct is with reference to Figure 13 of Ref. [4]: the curve that was drawn on this figure was by error a fit through the data and not Equation (8) of Ref. [4], in contradiction with what is stated in the text and legend. The correct plot is given in Fig. 6 below: the fit is slightly less good but still satisfactory.
Acknowledgements

This work was funded by the Swiss National Science Foundation under contract-no. 2000-063575.00. It is a pleasure to acknowledge discussions on this corrigendum with Mr. Randoald Müller of EPFL.
Figure 6. Fig. 13 of Ref. [4] replotted with the proper line for Eq. (8) of that reference.

References