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

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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.

Keywords: Composites; Dislocations; Aluminium; Stress-strain relationship measurements; Strain-gradient plasticity

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 ρ 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 ρ and the matrix plastic strain in the low-strain regime (Fig. 2),
– between the inverse of the microstructural scale $1/\lambda$ and ρ (Fig. 3),
– between the geometrical slip distances l_G and λ (Fig. 4), and

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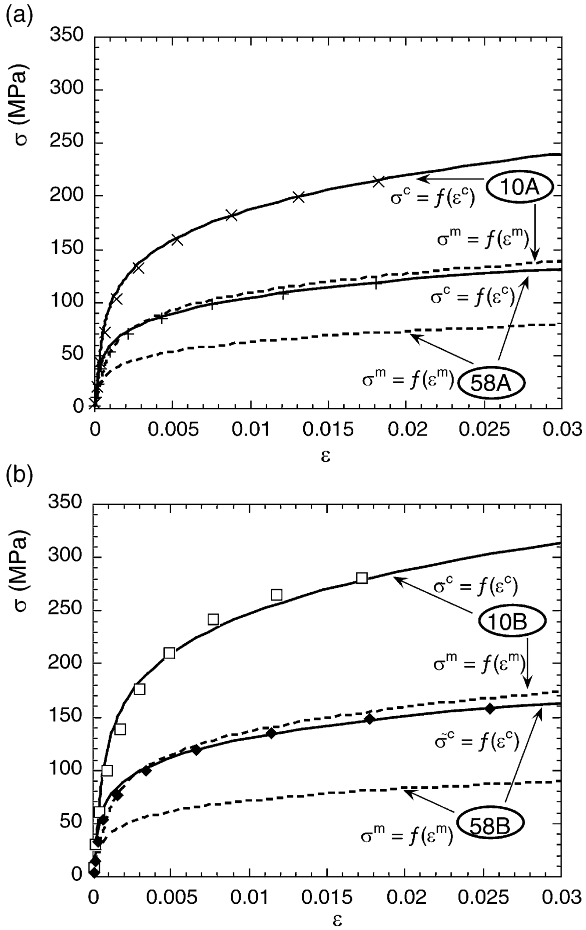

Figure 1. Fig. 5 of Ref. [1] replotted using corrected Eq. (6) of Ref. [2].

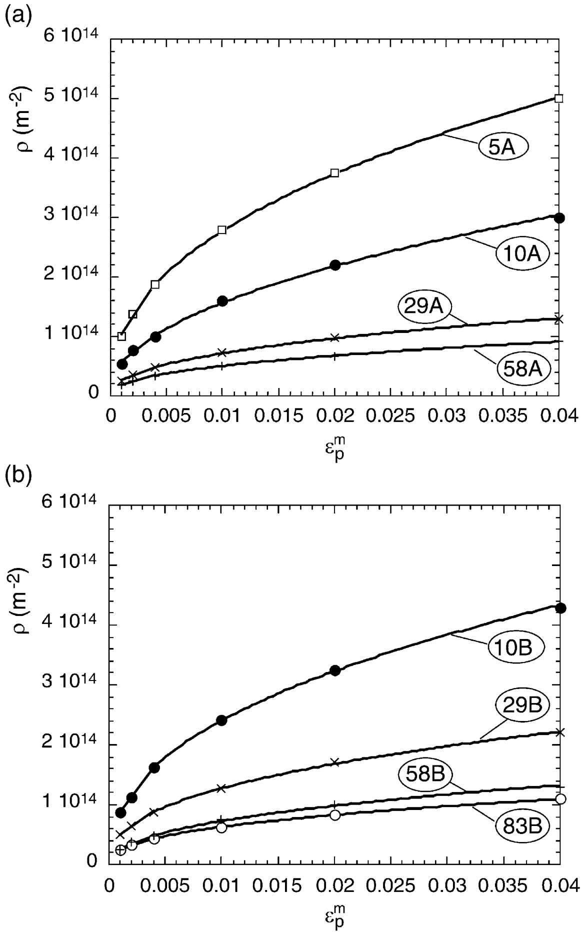

Figure 2. Fig. 6 of Ref. [1] replotted using corrected Eq. (6) of Ref. [2].

– between the logarithm of matrix strain and the logarithm of dislocation density ρ (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) λ (instead of (1/7) λ), and
– that the exponent of the power-law dependence of ρ_G and ρ_S with strain (Fig. 5) is near 0.4 for both ρ_G and ρ_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.

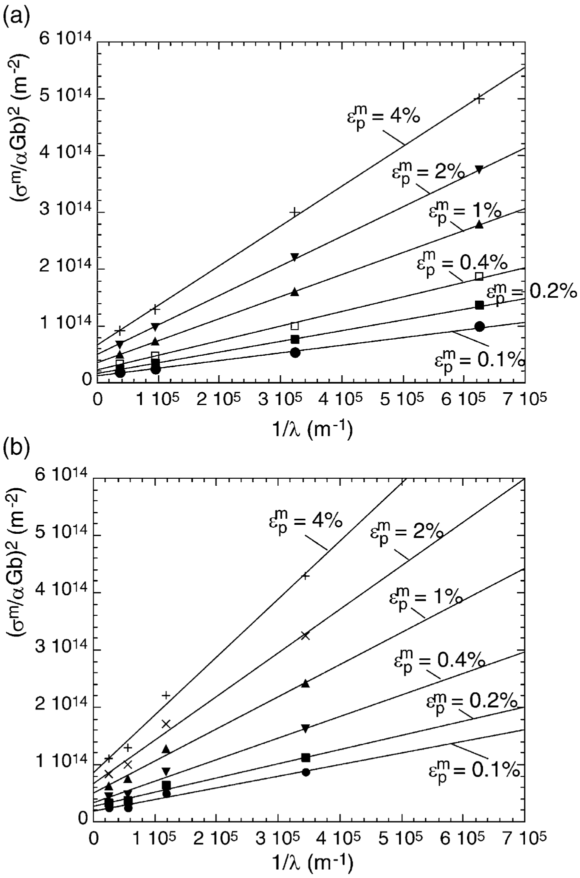

Figure 3. Fig. 7 of Ref. [1] replotted using corrected Eq. (6) of Ref. [2].

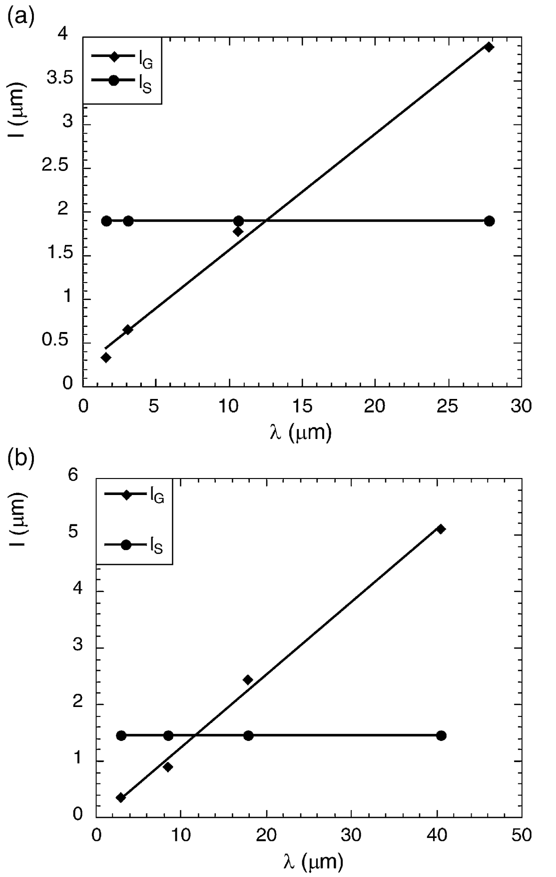

Figure 4. Fig. 8 of Ref. [1] replotted using corrected Eq. (6) of Ref. [2].

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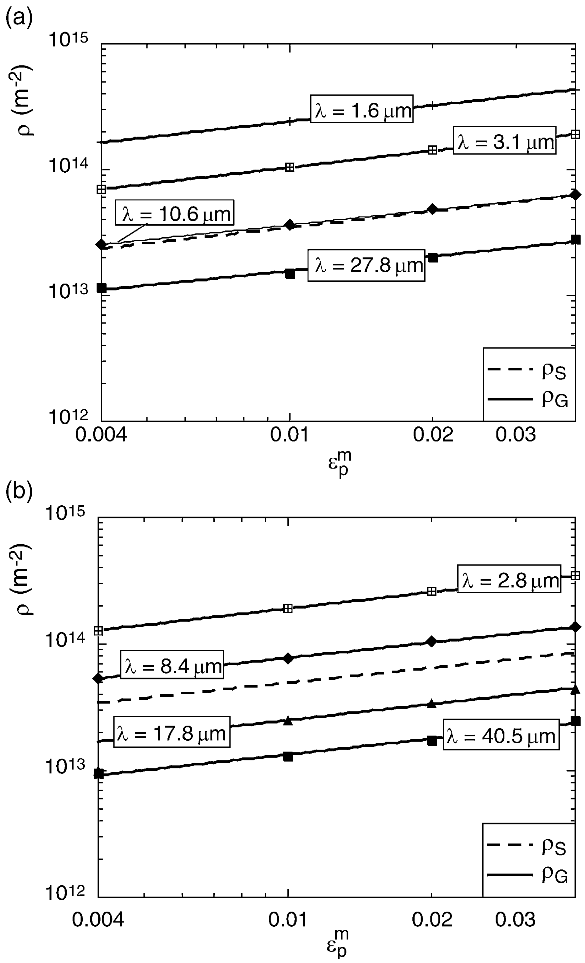

Figure 5. Fig. 9 of Ref. [1] replotted using corrected Eq. (6) of Ref. [2].

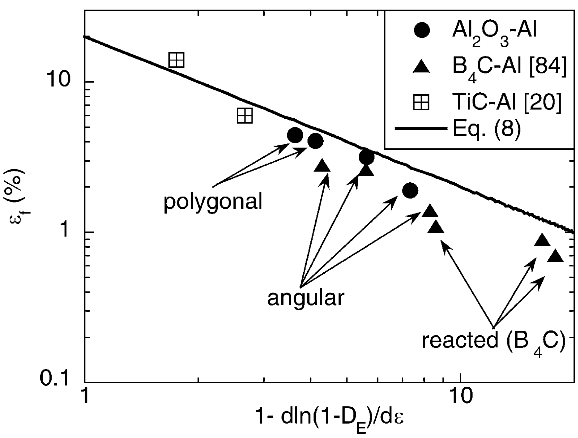

Figure 6. Fig. 13 of Ref. [4] replotted with the proper line for Eq. (8) of that reference.

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