Corrigendum to "Threshold stress and load partitioning during creep of MMCs"

Ricardo Fernández[§], Gaspar González-Doncel*

Dept. of Physical Metallurgy, Centro Nacional de Investigaciones Metalúrgicas (CENIM), C.S.I.C., Av. de Gregorio del Amo 8, E-28040 Madrid, Spain

[§] Present address, Thin Film R&D Dept. INDO, SA, C/ Alcalde Barnils 72, 08174 Sant Cugat del Vallés, Barcelona, Spain

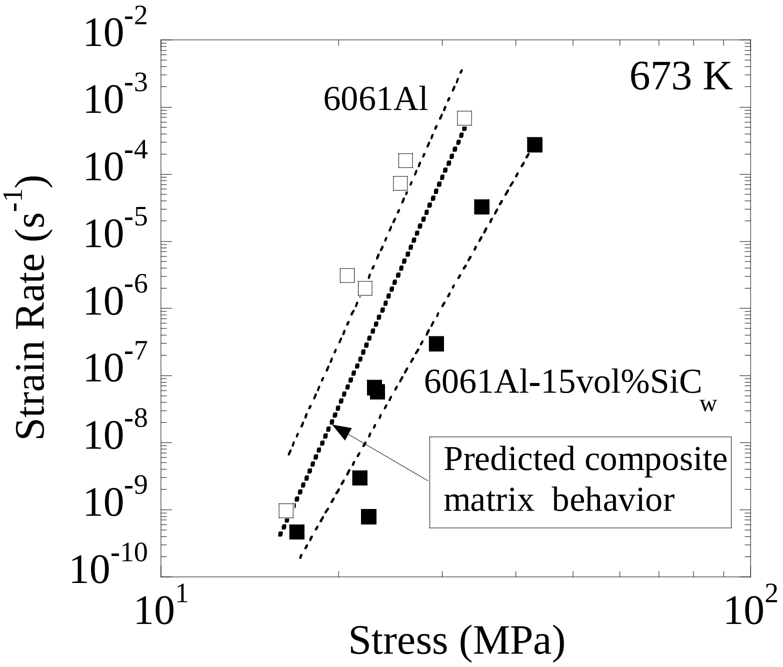
An error was noted by the authors regarding the calculation of the matrix strengthening factor during creep of MMCs through equations (5) and (6). The parameter a in equation (6) ($a = \lambda_{alloy} / \lambda_{comp}$) should be related with the dislocation density of the un-reinforced alloy, ρ_{alloy}, and the composite, ρ_{comp}, by the equation, $a = \lambda_{alloy} / \lambda_{comp} = \sqrt{\rho_{comp} / \rho_{alloy}}$. This value is equal to a = 1.97 (see dislocation density data of Table I). Therefore, the decrease in strain rate of the composite matrix at 673 K, according to equation (6),

$$\dot{\varepsilon}_{comp} = \frac{1}{a^3} \dot{\varepsilon}_{alloy} \tag{6}$$

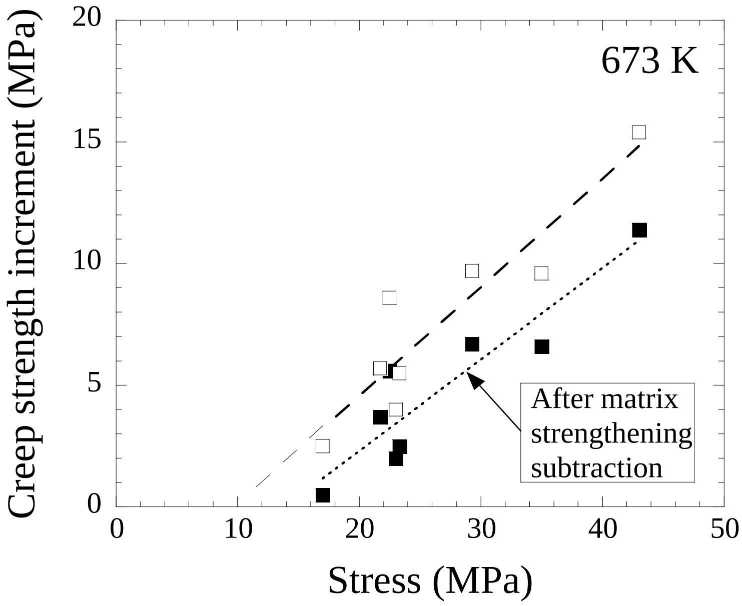
is 7.6 times lower than that of the un-reinforced alloy (a^3 = 7.6). As a consequence, the resulting matrix creep behavior is now plotted in Figure 5a) (dotted lines). This implies also a slight modification of figures 5b and figure 7, accordingly.

As can be seen, however, this slight difference does not undermine at all the results and conclusions defended in this work.

* Corresponding author, ggd@cenim.csic.es. Phone, +34 915538900 ext.337



a)



b)

Figure 5.- a) Creep rate as a function of the applied stress at 673 K in a double logarithmic plot of the PM 6061Al alloy (E220) and the PM 6061Al-15vol%SiC_w composite (E219). Dotted line refers to the expected composite matrix behavior (without reinforcement). b) Applied stress, σ, dependence of the composite creep strength increment, $\Delta'\sigma$ and $\Delta\sigma$ (after subtracting matrix strengthening), with respect the un-reinforced alloy at 673 K. A linear correlation of $\Delta'\sigma$ and $\Delta\sigma$ with σ is obtained.

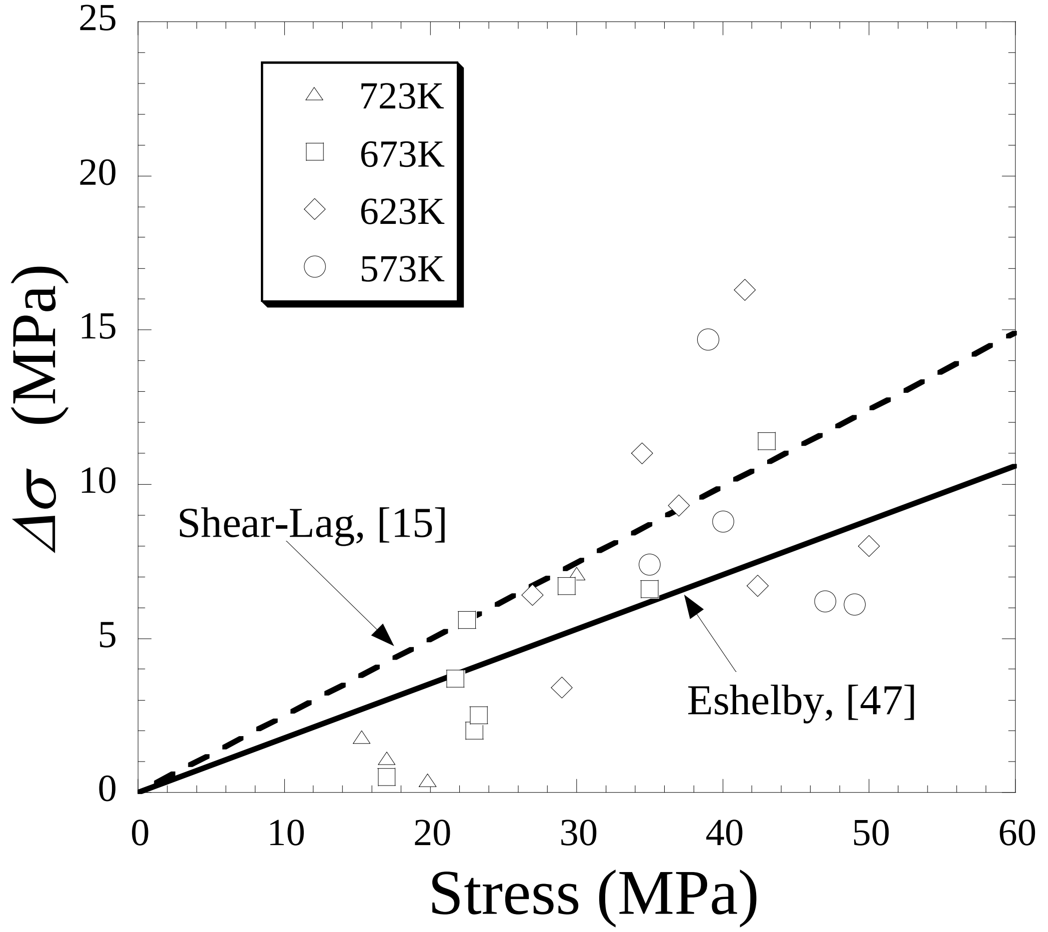


Figure 7.- Dependence of $\Delta\sigma$ with σ, as obtained from the experimental data of the composite and the predicted composite matrix behavior (matrix strengthening subtracted) at all temperatures investigated. A linear correlation between $\Delta\sigma$ and σ, with small variation due to temperature, is obtained. Dashed and solid lines correspond to σ_T, the predicted σ dependence of the load carried by the reinforcement according to the Shear-Lag and Eshelby models, respectively. The agreement between $\Delta\sigma$ and σ_T is significant considering the simple assumptions of the models.