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Corrigendum: The Role of Heat Transfer Limitations in Polymer Pyrolysis at the Microscale

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A Corrigendum on

The Role of Heat Transfer Limitations in Polymer Pyrolysis at the Microscale
by Richter, F., and Rein, G. (2018). Front. Mech. Eng. 4:18. doi: 10.3389/fmech.2018.00018

In the original article, there was an error. Equation (20) was misprinted.

A correction has been made to Discussion and Derivation of Thresholds, subsection Minimize Both Internal and External Heat Transfer Limitation, Equation (20):

$$Da = \frac{\tau_E}{\tau_c} = \frac{2\rho c R^2 \eta}{3 k_f \mathrm{Nu}} \tag{20}$$

Further, Equation (21) was also misprinted. A correction has been made to Discussion and Derivation of Thresholds, subsection Minimize Both Internal and External Heat Transfer Limitation, Equation (21):

$$m_c = \frac{0.0775\pi}{\sqrt{\rho}} \left(\frac{k_f \mathrm{Nu}}{c\eta} \right)^{3/2} \text{ with } \eta = A exp\left(-\frac{E}{RT_s} \right) \text{ with } log\, T_s = 2.5 + 0.047\, log\, \beta \tag{21}$$

Additionally, there was a mistake in the legend for Figure 8. "$log\, T_s = 0.047 + 2.5\, log\, \beta$" should be "$log\, T_s = 2.5 + 0.047\, log\, \beta$". The corrected Figure 8 legend appears below.

"Figure 8: Summary of derived and literature thresholds for transport limitations together with high-quality experiments. The threshold by Burnham et al. (2015) ($m_c = 10/\beta$) is for both intra- and interparticle heat transfer. The threshold Da<0.1 (Equation 21) is for interparticle heat transfer with $log\, T_s = 2.5 + 0.047 log\, \beta$. The threshold by Lyon et al. (2012) ($m_c = (1.1/\beta)^{3/2}$) and the threshold of $\Delta T_I < 1\, K$ (Equation 18) are for intraparticle heat transfer. The experiments are by: Gronli et al. (diamonds) (Grønli et al., 1999), Gronli et al. (thermal lag study)(triangle right) (Grønli et al., 1999), Antal et al. (triangle up) (Antal et al., 1998), and Lin et al. (squares) (Lin et al., 2009). All boundaries and experiments, except Lyon, are for cellulose. The graph is inspired by Lyon et al. (2012) and Burnham (2017)."

Lastly, in the original article, there was an error. We neglected to include a description of the length of scales used.

A correction has been made, and the following clarification has been added to the end of the Discussion and Derivation of Thresholds section, subsection Minimize Both Internal and External Heat Transfer Limitation:

"The paper uses two definitions for the characteristic length in heat transfer. One, L_1, represents the smallest distance along the maximum temperature difference. For conduction in a spherical particle that is $L_1 = R$. The other, L_2, represents the average distance for heat conduction (volume divided by surface area). For a spherical particle $L_2 = \frac{R}{3}$. The paper uses L_1 but also L_2 with regards to the previous work of Hayhurst (2013). L_1 is used in Equations (9–18) as well as Figures 6, 9. L_2 is used in Equations (19–21) as well as in Figures 7, 8."

The authors apologize for these errors and state that this does not change the scientific conclusions of the article in any way. The original article has been updated.

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