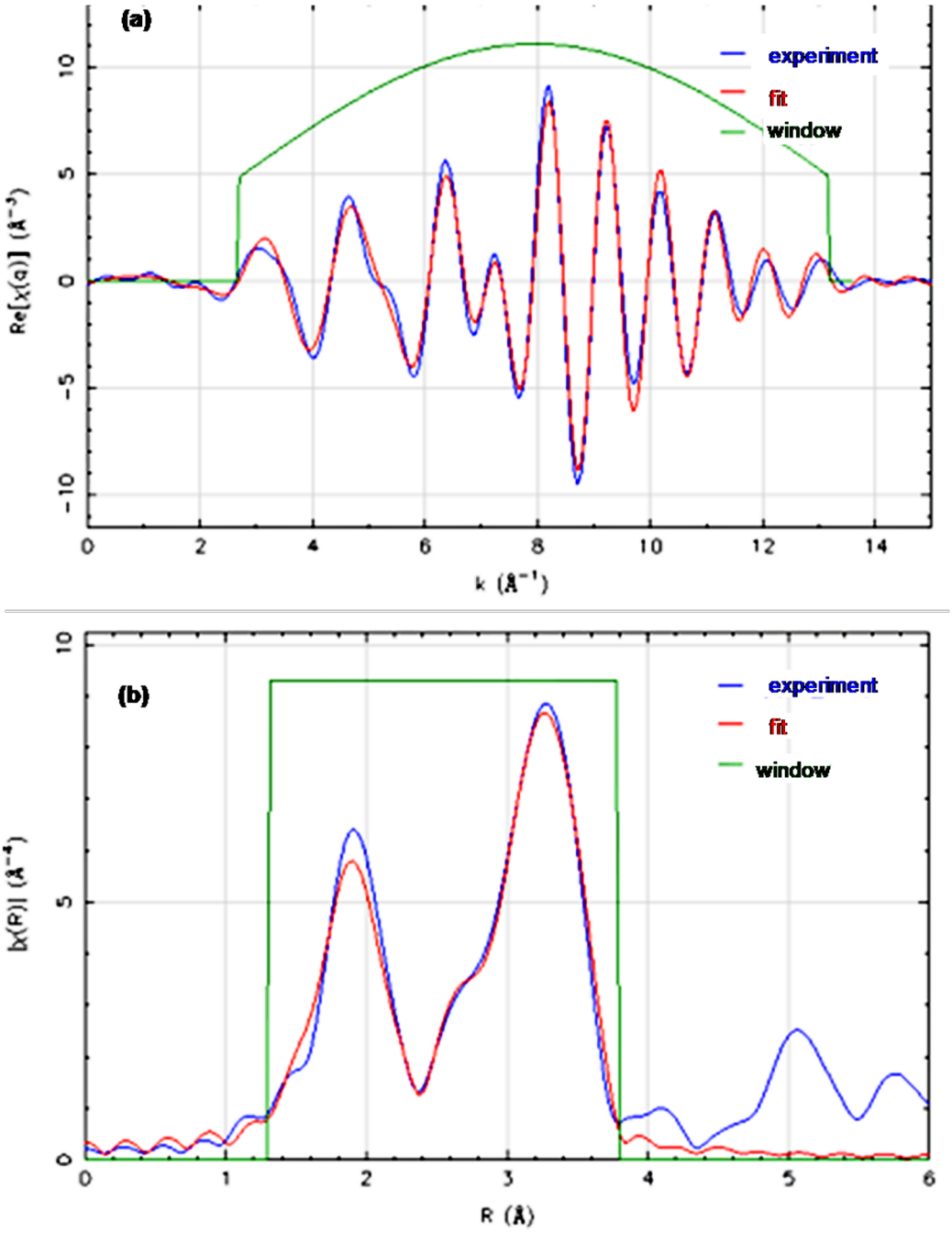


Fig. S1: (a)Experimental compared to linear least-squares fittings of $k^3\chi(k)$ EXAFS oscillations and (b)experimental compared to fitted first-shells filtered EXAFS spectra for unmodified YAG:Tb(20%) powder sintered for 4 h at 1100°C.

| Sample (Heating temperature) | | Absorbing atom | N | d (Å) | Sigma$^2$ *10$^3$(Å$^2$) | $R_F$ (%) |
|---|---|---|---|---|---|---|
| YAG :Tb(20%) $R_C$=0 | xerogel | O | 3.5±0.5 (4)<br>3.1±0.5 (4) | 2.33 (2.30)<br>2.46 (2.43) | 4.99<br>4.99 | 0.748<br>$e_{not}$=1.43 |
| | | Al | 1.6±0.7 (nd) | 3.30 (nd) | 16.9 | |
| | | Y | 0.7±0.4 (3.2) | 3.79 (3.67) | 8.77 | |
| | 200°C | O | 3.9±0.5 (4)<br>2.3±0.7 (4) | 2.34 (2.30)<br>2.47 (2.43) | 5.60<br>5.60 | 1.02<br>$e_{not}$=1.47 |
| | | Al | 1.6±0.8 (nd) | 3.29 (nd) | 15.41 | |
| | | Y | 0.6±0.5 (3.2) | 3.81 (3.67) | 7.95 | |
| | 400°C | O | 4.0±0.4 (4)<br>2.3±0.6 (4) | 2.32 (2.30)<br>2.45 (2.43) | 9.54<br>9.54 | 0.357<br>$e_{not}$=1.00 |
| | | Al | 1.3±0.4 (nd) | 3.15 (nd) | 14.2 | |
| | | Y | 1.7±0.5 (3.2) | 3.71 (3.67) | 13.6 | |
| | | Tb | 0.8±0.6 (0.8) | 3.71 (3.67) | 13.6 | |
| | 600°C | O | 3.9±0.4 (4)<br>1.9±0.6 (4) | 2.32 (2.30)<br>2.45 (2.43) | 10.6<br>10.6 | 0.283<br>$e_{not}$=0.90 |
| | | Al | 1.4± 0.4 tetra (2) | 3.14 (3.00) | 11.9 | |
| | | Y | 1.3±0.9 (3.2) | 3.71 (3.67) | 12.1 | |
| | | Tb | 0.6±0.9 (0.8) | 3.71 (3.67) | 12.1 | |
| | 700°C | O | 4.1±0.4 (4)<br>2.3±0.6 (4) | 2.32 (2.30)<br>2.44 (2.43) | 10.6<br>10.6 | 0.329<br>$e_{not}$=0.92 |
| | | Al | 1.3±0.3 tetra (2) | 3.14 (3.00) | 11.3 | |
| | | Y | 2.0±0.4 (3.2) | 3.71 (3.67) | 11.9 | |
| | | Tb | 0.8±0.6 (0.8) | 3.71 (3.67) | 11.9 | |
| | 800°C | O | 3.0±0.3 (4)<br>2.8±0.3 (4) | 2.31 (2.30)<br>2.44 (2.43) | 4.73<br>4.73 | 1.26<br>$e_{not}$=1.56 |
| | | Al | 1.2± 0.3 tetra (2)<br>2.1±1.0 octa (4)<br>2.1±0.8 (4) | 3.04 (3.00)<br>3.40 (3.35)<br>3.71 (3.67) | 4.22<br>11.6<br>4.88 | |
| | | Y | 2.8±0.3 (3.2) | 3.71 (3.67) | 4.88 | |
| | | Tb | 1.2±0.3 (0.8) | 3.71 (3.67) | 4.88 | |
| | 1100°C | O | 4 (4)<br>4 (4) | 2.32 (2.30)<br>2.46 (2.43) | 5.70<br>5.70 | 3.56<br>$e_{not}$=1.83 |
| | | Al | 2 tetra (2)<br>4 octa (4)<br>4 (4) | 3.04 (3.00)<br>3.38 (3.35)<br>3.71 (3.67) | 3.24<br>9.26<br>2.66 | |
| | | Y | 3 (3.2) | 3.70 (3.67) | 2.66 | |
| | | Tb | 1 (0.8) | 3.70 (3.67) | 2.66 | |

Table S1: Structural parameters determined from the EXAFS data recorded at Tb edge for unmodified samples.

| Sample (Heating temperature) | | Absorbing atom | N | d (Å) | Sigma$^2$ *10$^3$(Å$^2$) | $R_F$ (%) |
|---|---|---|---|---|---|---|
| YAG :Tb(20%) $R_C$=1 | xerogel | O | 5.0±0.5 (4)<br>2.6±0.9 (4) | 2.34 (2.30)<br>2.47 (2.43) | 6.48<br>6.48 | 1.03<br>$e_{not}$=0.93 |
| | | Al | 1.0±0.6 (nd) | 3.33 (nd) | 13.3 | |
| | | Y | 0.4±0.5 (3.2) | 3.82 (3.67) | 6.73 | |
| | 200°C | O | 4.2±0.5 (4)<br>2.9±0.7 (4) | 2.34 (2.30)<br>2.47 (2.43) | 6.40<br>6.40 | 0.768<br>$e_{not}$=1.30 |
| | | Al | 1.1±0.6 (nd) | 3.27 (nd) | 12.0 | |
| | | Y | 0.8±0.4 (3.2) | 3.77 (3.67) | 7.07 | |
| | | Tb | 0.6±0.6 (3.2) | 3.77 (3.67) | 7.07 | |
| | 400°C | O | 3.2±0.8 (4)<br>2.8±1.0 (4) | 2.31(2.30)<br>2.44 (2.43) | 6.33<br>6.33 | 0.678<br>$e_{not}$=1.09 |
| | | Al | 0.9±0.2 (nd) | 3.20 (nd) | 10.4 | |
| | | Y | 0.6±0.5 (3.2) | 3.71 (3.67) | 7.27 | |
| | | Tb | 0.2±0.8 (0.8) | 3.71 (3.67) | 7.27 | |
| | 600°C | O | 2.6±0.5 (4)<br>2.2±0.6 (4) | 2.29 (2.30)<br>2.42 (2.43) | 5.80<br>5.80 | 1.05<br>$e_{not}$=1.18 |
| | | Al | 0.9±0.2 tetra (2) | 3.11 (3.00) | 5.22 | |
| | | Y | 1.4±0.3 (0.3) | 3.69 (3.67) | 5.74 | |
| | | Tb | 0.9±0.4 (0.8) | 3.69 (3.67) | 5.74 | |
| | 700°C | O | 2.5±0.5 (4)<br>2.5±0.5 (4) | 2.29 (2.30)<br>2.42 (2.43) | 4.72<br>4.72 | 0.580<br>$e_{not}$=1.10 |
| | | Al | 1.1±0.2 tetra (2) | 3.06 (3.00) | 6.32 | |
| | | Y | 2.8±0.3 (3.2) | 3.71 (3.67) | 5.70 | |
| | | Tb | 1.4±0.4 (0.8) | 3.71 (3.67) | 5.70 | |
| | 800°C | O | 2.8±0.6 (4)<br>3.6±0.9 (4) | 2.31 (2.30)<br>2.44 (2.43) | 3.84<br>3.84 | 2.21<br>$e_{not}$=1.80 |
| | | Al | 2.0±0.3 tetra (2)<br>4.1±0.9 octa (4)<br>3.9±0.3 (4) | 3.04 (3.00)<br>3.40 (3.35)<br>3.71 (3.67) | 3.98<br>9.58<br>3.84 | |
| | | Y | 2.7±0.6 (3.2) | 3.71 (3.67) | 3.84 | |
| | | Tb | 1.3±0.6 (0.8) | 3.71 (3.67) | 3.84 | |
| | 1100°C | O | 4 (4)<br>4 (4) | 2.32 (2.30)<br>2.45 (2.43) | 6.2<br>6.2 | 2.94<br>$e_{not}$=1.80 |
| | | Al | 2 tetra (2)<br>4 octa (4)<br>4 (4) | 3.04 (3.00)<br>3.38 (3.35)<br>3.71 (3.67) | 2.58<br>8.01<br>3.55 | |
| | | Y | 3 (3.2) | 3.70 (3.67) | 3.55 | |
| | | Tb | 1 (0.8) | 3.70 (3.67) | 3.55 | |

Table S2: Structural parameters determined from the EXAFS data recorded at Tb edge for modified samples.

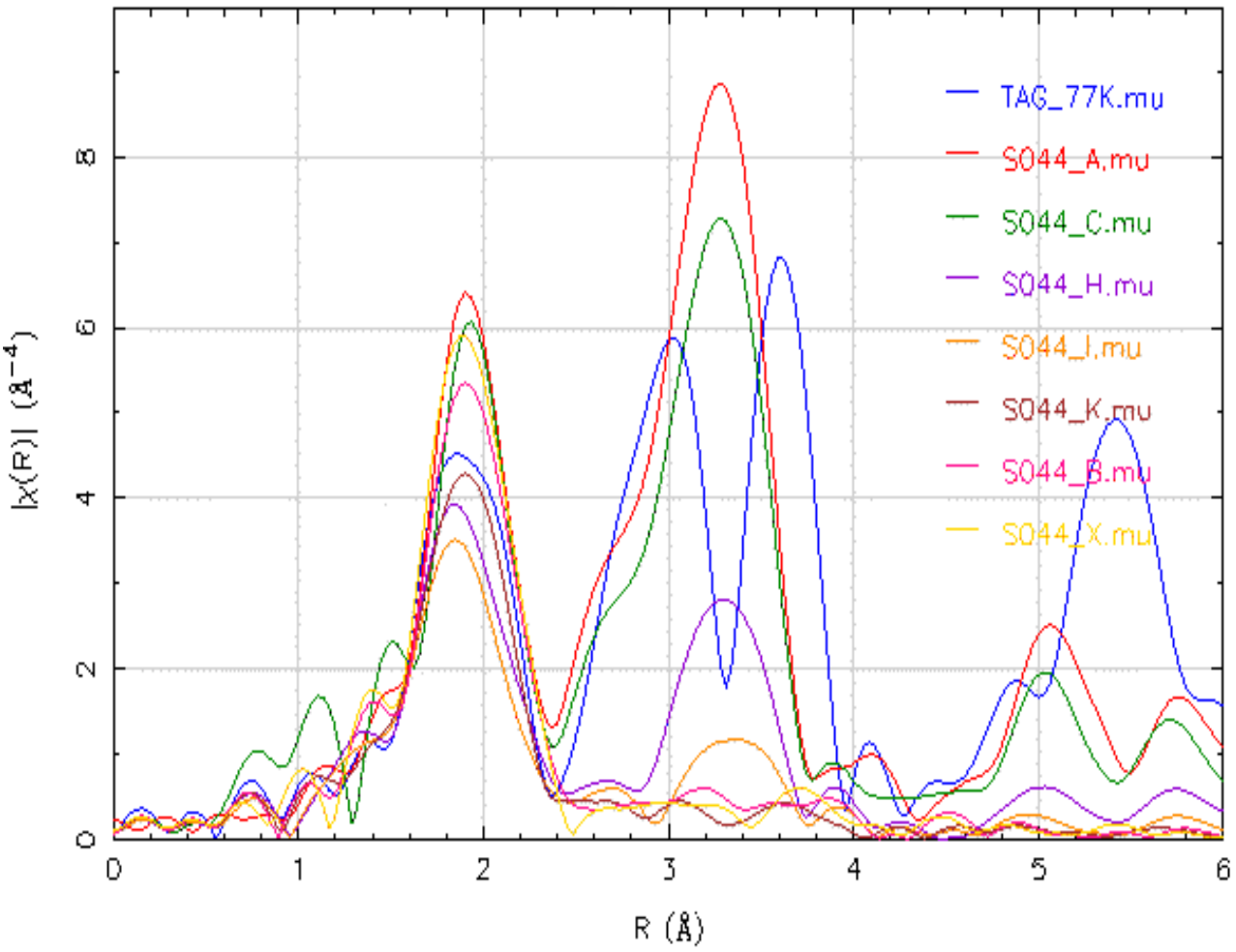


Fig. S2: PRDFs uncorrected from phase shift for TAG and acac-modified YAG powders($R_C$=1) sintered at different temperatures: X – xerogel, B – 200°C, K – 400°C, I – 600°C, H – 700°C, C – 800°C and A – 1100°C.