

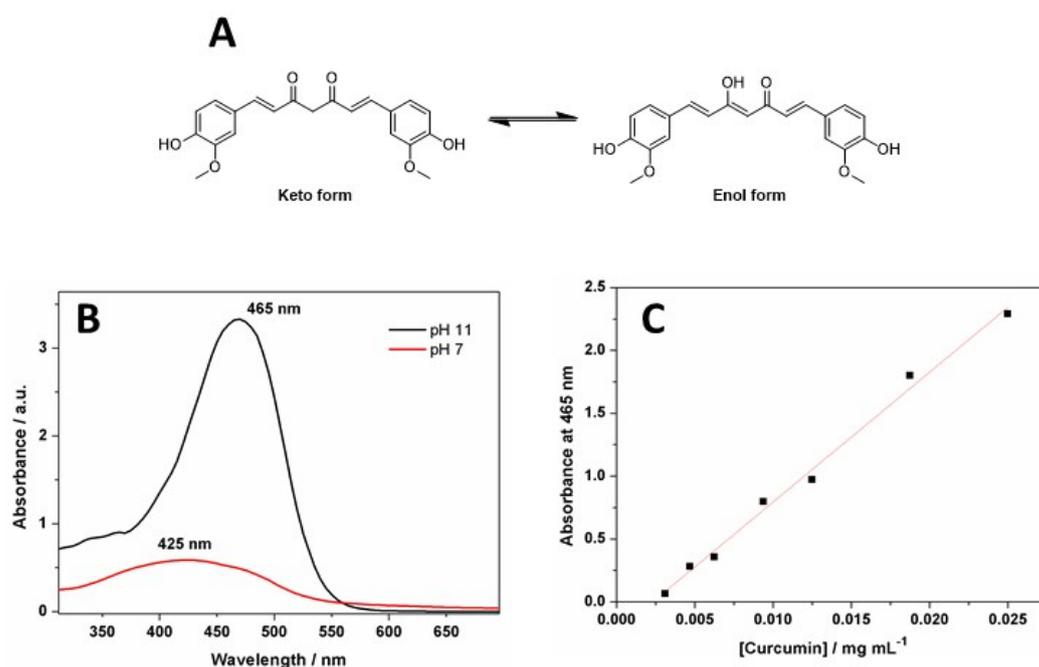
## SUPPLEMENTARY INFORMATION

# Enhancing curcumin's solubility and antibiofilm activity via silica surface modification

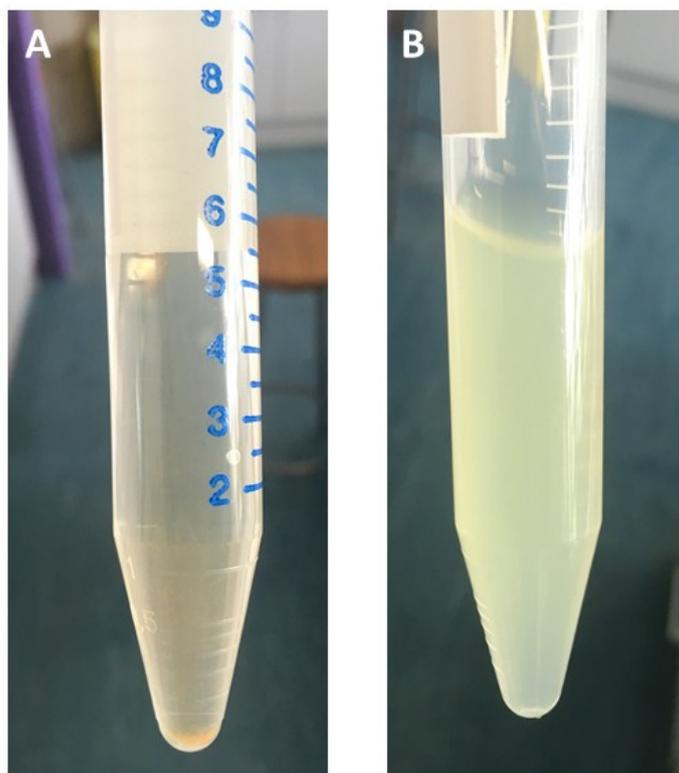
Caio H. N. Barros,<sup>a</sup> Henry Devlin,<sup>a</sup> Dishon W. Hiebner,<sup>a</sup> Stefania Vitale,<sup>a</sup> Laura Quinn<sup>a</sup> and Eoin Casey<sup>a,\*</sup>

<sup>a</sup>School of Chemical and Bioprocess Engineering, University College Dublin, Ireland

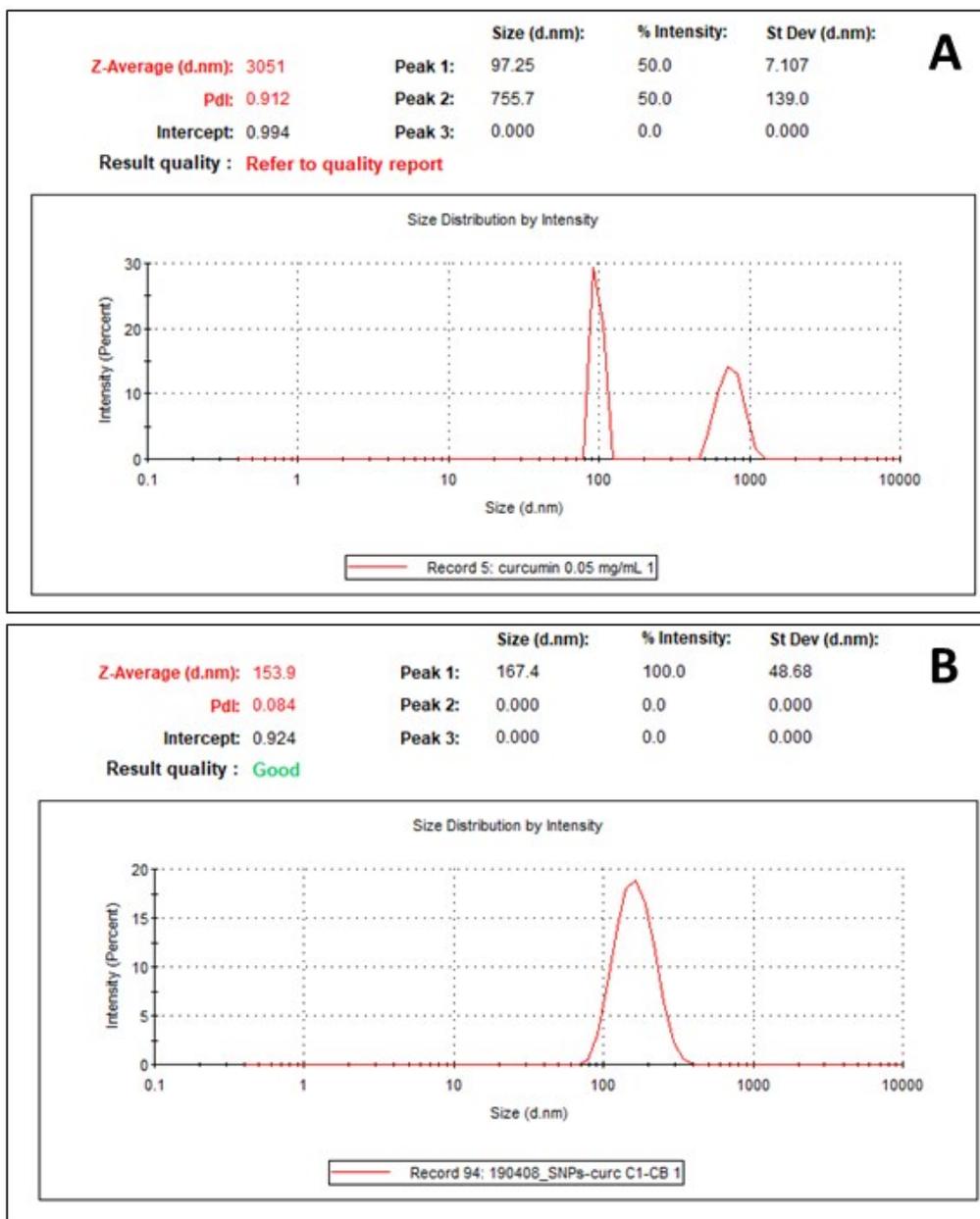
\*Corresponding author: [eoyn.casey@ucd.ie](mailto:eoyn.casey@ucd.ie)



**Figure S1.** Tautomerism of curcumin between keto and enol form (A) UV-visible absorption spectra of curcumin at pH 7 (keto isomer) and pH 11 (enol isomer) (B) and calibration curve of curcumin at pH 11 (C)



**Figure S2.** Photographic image of a  $0.05 \text{ mg mL}^{-1}$  free curcumin aqueous solution showing precipitation as a result of poor solubility of curcumin in water (A) and suspension of curc-NPs in water at  $5.0 \text{ mg mL}^{-1}$  (B).



**Figure S3.** Dynamic Light Scattering intensity profile of free curcumin at 0.05 mg mL<sup>-1</sup> (A) and curc-NPs at 5.0 mg mL<sup>-1</sup> (B).

**Table S1.** Proteins identified using LC-MS/MS in biofilm EPS fractions cultured under three different conditions

<b>Control</b>	
<b>Uniprot</b>	<b>Protein name</b>
P59374	30S ribosomal protein S11
Q88BX2	ATP synthase subunit alpha
Q88DE8	30S ribosomal protein S6
Q88DU1	Protein GrpE
Q88FB9	Chaperone protein HtpG
Q88MF9	Enolase
Q88MI0	30S ribosomal protein S2
Q88N55	60 kDa chaperonin
Q88PK1	Nucleoside diphosphate kinase
Q88Q27	K Serine hydroxymethyltransferase 2
Q88Q71	Chaperone protein ClpB
Q88QL2	30S ribosomal protein S4
Q88QL8	30S ribosomal protein S5
Q88QL9	50S ribosomal protein L18
Q88QN0	50S ribosomal protein L22
Q88QN2	50S ribosomal protein L2
Q88QN5	50S ribosomal protein L3
Q88QN6	30S ribosomal protein S10
Q88QP8	Elongation factor Tu-A
Q88QP1	DNA-directed RNA polymerase subunit beta
Q88QP2	DNA-directed RNA polymerase subunit beta
Q88CY3	Glutamine synthetase
Q88FA9	2-oxoglutarate decarboxylase, thiamine-requiring E1 subunit
Q88K29	Nucleic acid cold-shock chaperone
Q88K38	Ribose ABC transporter, periplasmic ribose-binding subunit
Q88KS2	Enoyl-CoA hydratase
Q88M19	DUF2059 domain-containing protein
Q88NY2	Glutamate / aspartate ABC transporter-periplasmic binding protein
Q88P44	Glyceraldehyde-3-phosphate dehydrogenase
Q88P78	Putative DNA-binding protein HU, form N
Q88RA6	Periplasmic cystine-binding protein
Q88P44	Glyceraldehyde-3-phosphate dehydrogenase
Q88P78	Putative DNA-binding protein HU, form N
Q88RA6	Periplasmic cystine-binding protein
<b>Exposure to free curcumin 0.05 mg/mL</b>	
<b>Uniprot</b>	<b>Protein name</b>
P0A136	Adenylate kinase
P0A138	Peptidoglycan-associated lipoprotein
P0A157	50S ribosomal protein L7/L12
P0A165	30S ribosomal protein S21
P0A173	Tol-Pal system protein TolB

Q88BX0	ATP synthase subunit b
Q88BX2	ATP synthase subunit alpha
Q88BX3	ATP synthase gamma chain
Q88BX4	ATP synthase subunit beta
Q88BX5	ATP synthase epsilon chain
Q88CQ2	Dihydroxy-acid dehydratase
Q88CX4	2,3-bisphosphoglycerate-independent phosphoglycerate mutase
Q88D47	UPF0312 protein PP_4981
Q88DE8	30S ribosomal protein S6
Q88DF1	50S ribosomal protein L9
Q88DK3	Bifunctional purine biosynthesis protein PurH
Q88DU1	Protein GrpE
Q88DU2	Chaperone protein DnaK
Q88DU6	Carbamoyl-phosphate synthase large chain
Q88DU7	Transcription elongation factor GreA
Q88DV9	30S ribosomal protein S15
Q88LW9	Glucose-6-phosphate isomerase 1
Q88DZ0	Ketol-acid reductoisomerase (NADP(+))
Q88EI9	Aspartate kinase
Q88FB2	Succinate--CoA ligase [ADP-forming] subunit beta
Q88FB9	Chaperone protein HtpG
Q88FT2	Serine--tRNA ligase
Q88G93	Translational regulator CsrA
Q88K24	50S ribosomal protein L20
Q88KJ1	Trigger factor
Q88LE5	3-isopropylmalate dehydrogenase
Q88LS0	Elongation factor P
Q88M20	Fumarate hydratase class II
Q88MF9	Enolase
Q88MG0	2-dehydro-3-deoxyphosphooctonate aldolase 1
Q88MH7	Ribosome-recycling factor
Q88MH9	Elongation factor Ts
Q88MV3	50S ribosomal protein L19
Q88N27	Oxaloacetate decarboxylase
Q88N55	60 kDa chaperonin
Q88N97	50S ribosomal protein L13
Q88NC4	GDP-mannose 6-dehydrogenase
Q88NJ4	Aspartate--tRNA(Asp/Asn) ligase
Q88NX8	Glycerol kinase
Q88P53	Ornithine carbamoyltransferase, catabolic
Q88Q27	Serine hydroxymethyltransferase 2
Q88Q71	Chaperone protein ClpB
Q88Q92	Isoleucine--tRNA ligase
Q88QL1	DNA-directed RNA polymerase subunit alpha
Q88QL2	30S ribosomal protein S4
Q88QL3	30S ribosomal protein S13

Q88QL6	50S ribosomal protein L15
Q88QL8	30S ribosomal protein S5
Q88QL9	50S ribosomal protein L18
Q88QM0	50S ribosomal protein L6
Q88QM5	50S ribosomal protein L14
Q88QM9	30S ribosomal protein S3
Q88QN2	50S ribosomal protein L2
Q88QN3	50S ribosomal protein L23
Q88QN5	50S ribosomal protein L3
Q88QN6	30S ribosomal protein S10
Q88QP8	Elongation factor Tu-A
Q88QN9	30S ribosomal protein S7
Q88QP0	30S ribosomal protein S12
Q88QP1	DNA-directed RNA polymerase subunit beta
Q88QP2	DNA-directed RNA polymerase subunit beta
Q88QP4	50S ribosomal protein L1
Q88RB9	5-aminovalerate aminotransferase DavT
A0A140FWS3	Adenosylhomocysteinase
Q88C37	Pyruvate carboxylase subunit B
Q88CA3	4-guanidinobutyraldehyde dehydrogenase
Q88CC3	L-piperidine-6-carboxylate dehydrogenase
Q88CJ8	Polyamine:pyruvate transaminase
Q88CU5	Malic enzyme B
Q88CY3	Glutamine synthetase
Q88D62	Transketolase
Q88D67	Fructose-1,6-bisphosphate aldolase
Q88DV6	Transcription termination/antitermination protein NusA
Q88EH7	Lysine / arginine / ornithine ABC transporter-periplasmic binding protein
Q88EX0	Chemotaxis protein CheW
Q88F96	Electron transfer flavoprotein subunit beta
Q88F97	Electron transfer flavoprotein subunit alpha
Q88FA7	Succinate dehydrogenase flavoprotein subunit
Q88FA9	2-oxoglutarate decarboxylase, thiamine-requiring E1 subunit
Q88FB1	Dihydrolipoyl dehydrogenase
Q88FB3	Succinate--CoA ligase [ADP-forming] subunit alpha
Q88FC3	3-oxoacyl-[acyl-carrier-protein] synthase 1
Q88FI0	Isocitrate lyase
Q88FN4	Glycogen debranching enzyme
Q88FR7	Adenylosuccinate lyase
Q88FS1	Isocitrate dehydrogenase [NADP]
Q88FS2	Isocitrate dehydrogenase [NADP]
Q88GA5	Glutathione reductase
Q88H54	Branched-chain-amino-acid aminotransferase
Q88K29	Nucleic acid cold-shock chaperone
Q88K38	Ribose ABC transporter, periplasmic ribose-binding subunit
Q88K52	Alkyl hydroperoxide reductase C

Q88KF1	Aconitate hydratase B
Q88KF5	Citrate synthase
Q88L46	Outer membrane porin F
Q88L53	Phosphoenolpyruvate synthase
Q88L55	NAD-specific glutamate dehydrogenase
Q88LG1	Aminotransferase
Q88LL6	3-oxoacyl-[acyl-carrier-protein] reductase subunit
Q88M03	30S ribosomal protein S1
Q88M19	DUF2059 domain-containing protein
Q88M48	ABC transporter, periplasmic binding protein
Q88MD5	Ferredoxin--NADP(+) reductase
Q88MH1	Skp-like protein
Q88MR7	OmpA family protein
Q88MU0	Putative Xenobiotic reductase
Q88N50	Transcriptional regulator MvaT, P16 subunit
Q88NB5	Putative amino-acid ABC transporter-binding protein YhdW
Q88NR4	Branched-chain amino acids ABC transporter-periplasmic leucine binding subunit
Q88NV5	Cold shock protein CapB
Q88NW9	Putative peroxiredoxin
Q88NY2	Glutamate / aspartate ABC transporter-periplasmic binding protein
Q88P22	Inosine-5-monophosphate dehydrogenase
Q88P38	Mannose/glucose ABC transporter, glucose-binding periplasmic protein
Q88P44	Glyceraldehyde-3-phosphate dehydrogenase
Q88P98	Lipopolysaccharide export system protein LptA
Q88PG5	Dipeptide ABC transporter-periplasmic binding protein
Q88PL2	Inositol-1-monophosphatase
Q88PP2	Putative Surface adhesion protein
Q88PT2	Uncharacterized protein
Q88Q14	Peptidyl-prolyl cis-trans isomerase
Q88QU0	Protein kinase
Q88QZ5	Pyruvate dehydrogenase E1 component
Q88R38	Choline / betaine / carnitine ABC transporter-substrate binding protein
Q88RA6	Periplasmic cystine-binding protein
Q88RE1	Transcriptional regulatory protein AlgQ
Q88RG2	Putative surface adhesion protein
Q88RP0	Stress-induced peroxiredoxin, lipoyl-dependent peroxidase
Q88RQ7	Quinone oxidoreductase

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**Exposure to curc-NPs 5.0 mg/mL**

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Q88BX0	ATP synthase subunit b
Q88BX2	ATP synthase subunit alpha
Q88BX3	ATP synthase gamma chain
Q88BX5	ATP synthase epsilon chain
Q88DD8	Adenylosuccinate synthetase
Q88DE8	30S ribosomal protein S6
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Q88DU1	Protein GrpE
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Q88EI8	Alanine--tRNA ligase
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Q88FB9	Chaperone protein HtpG
Q88FI4	Elongation factor G 2
Q88G93	Translational regulator CsrA
Q88K24	50S ribosomal protein L20
Q88KJ1	Trigger factor
Q88MF9	Enolase
Q88MI0	30S ribosomal protein S2
Q88N30	Probable efflux pump periplasmic linker TtgA
Q88N55	60 kDa chaperonin
Q88NC4	GDP-mannose 6-dehydrogenase
Q88NJ4	Aspartate--tRNA(Asp/Asn) ligase
Q88NX8	Glycerol kinase
Q88P52	Arginine deiminase
Q88P53	Ornithine carbamoyltransferase, catabolic
Q88P88	UDP-N-acetylglucosamine 1-carboxyvinyltransferase
Q88Q10	50S ribosomal protein L21
Q88Q27	Serine hydroxymethyltransferase 2
Q88Q71	Chaperone protein ClpB
Q88QL2	30S ribosomal protein S4
Q88QL3	30S ribosomal protein S13
Q88QL8	30S ribosomal protein S5
Q88QL9	50S ribosomal protein L18
Q88QM0	50S ribosomal protein L6
Q88QM5	50S ribosomal protein L14
Q88QM9	30S ribosomal protein S3
Q88QN0	50S ribosomal protein L22
Q88QN2	50S ribosomal protein L2
Q88QP8	Elongation factor Tu-A
Q88QN8	Elongation factor G 1
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Q88QP2	DNA-directed RNA polymerase subunit beta
Q88QP3	50S ribosomal protein L10
Q88QP4	50S ribosomal protein L1
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Q88RB9	5-aminovalerate aminotransferase DavT
Q88C37	Pyruvate carboxylase subunit B
Q88CU5	Malic enzyme B
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