

Comparative evaluation of MAX-Ti₃AlC₂ and 2D MXene-Ti₃C₂ as affinity chromatography stationary phases for highly selective enrichment of phosphopeptides

Xiaowei Li^{a, b}, Na Zhang^{a, b}, Ruizhi Tang^a, Jiawen Lv^{a, b}, Zhen Liu^{a, b}, Shujuan Ma^a,
Junjie Ou^{a, b,*}, Mingliang Ye^{a, b}

^aCAS Key Laboratory of Separation Science for Analytical Chemistry, Dalian Institute of Chemical Physics, Chinese Academy of Sciences (CAS), Dalian, 116023, China

^bUniversity of Chinese Academy of Sciences, Beijing, 100049, China

* To whom correspondence should be addressed:

Prof. JunjieOu

Tel: +86-411-84379576

Fax: +86-411-84379620

E-mail: junjieou@dicp.ac.cn

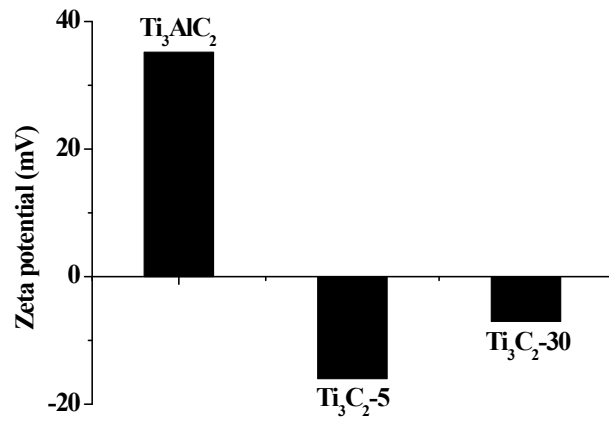


Fig. S1. Zeta potential of Ti_3AlC_2 , Ti_3C_2-5 and Ti_3C_2-30 .

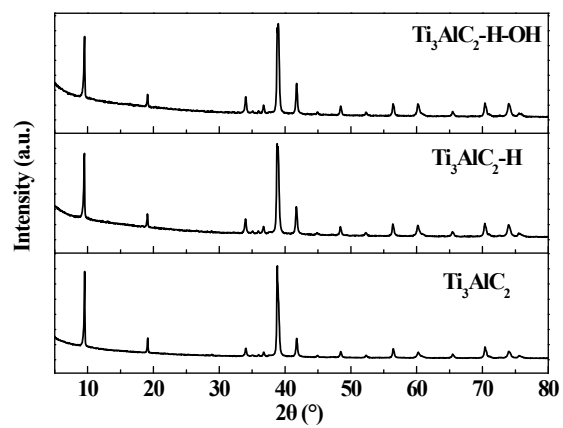


Fig. S2. XRD patterns of Ti_3AlC_2 , $\text{Ti}_3\text{AlC}_2\text{-H}$ (after treatment with loading and washing solution) and $\text{Ti}_3\text{AlC}_2\text{-H-OH}$ (after treatment with loading, washing and elution solution).

Table S1. Detail information of phosphoproteins and phosphopeptides enriched from tryptic digest of milk using Ti_3AlCl_2 .

Phosphoprotein	Phosphopeptide	Modification
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	VNELSK	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	YLGYLEQLLR	Phospho (Y)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	VPQLEIVPNSAEER	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	DIGSESTEDQAMEDIK	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	DIGSESTEDQAMEDIK	Oxidation (M); Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	DIGSESTEDQAMEDIK	2 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	DIGSESTEDQAMEDIK	Oxidation (M); 2 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	YKVPQLEIVPNSAEER	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	DIGSESTEDQAMEDIK	3 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	YKVPQLEIVPNSAEER	Phospho (ST); Phospho (Y)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	VNELSKDIGSESTEDQAMEDIK	2 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	VNELSKDIGSESTEDQAMEDIK	Oxidation (M); 2 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	QMEAESISSSEEIVPNSVEQK	4 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	QMEAESISSSEEIVPNSVEQK	Oxidation (M); 4 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	VNELSKDIGSESTEDQAMEDIK	3 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	VNELSKDIGSESTEDQAMEDIK	Oxidation (M); 3 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	QMEAESISSSEEIVPNSVEQK	5 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	VNELSKDIGSESTEDQAMEDIK	4 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	EKVNELSKDIGSESTEDQAMEDIK	2 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	EKVNELSKDIGSESTEDQAMEDIK	3 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	QMEAESISSSEEIVPNSVEQKHIQK	5 Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	FQSEEQQTDELQDK	Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	FQSEEQQTDELQDK	2 Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	IEKFQSEEQQTDELQDK	Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	KIEKFQSEEQQTDELQDK	Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	ELEELNVPGEIVESLSSEESITR	Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	ELEELNVPGEIVESLSSEESITR	2 Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	ELEELNVPGEIVESLSSEESITR	3 Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	ELEELNVPGEIVESLSSEESITR	4 Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	ELEELNVPGEIVESLSSEESITRINK	4 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NMAINPSK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NMAINPSK	Oxidation (M); Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	TKLTEEEK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	EQLSTSEENSK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	EQLSTSEENSK	2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	EQLSTSEENSKK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	TVDMESTEVFTK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	TVDMESTEVFTK	Oxidation (M); Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	EQLSTSEENSK	3 Phospho (ST)

CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	EQLSTSEENSKK	2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	TVDMESTEVFTK	2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	TVDMESTEVFTK	Oxidation (M); 2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	KTVDMESTEVEFTK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	TVDMESTEVFTKK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	KTVDMESTEVEFTK	Oxidation (M); Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	TVDMESTEVFTKK	Oxidation (M); Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	EQLSTSEENSKK	3 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	KTVDMESTEVEFTK	2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	KTVDMESTEVEFTK	Oxidation (M); 2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NMAINPSKENLCSTFCK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NMAINPSKENLCSTFCK	Oxidation (M); Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSSEESIISQETYK	2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSSEESIISQETYK	Oxidation (M); 3 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NAVPIPTLNRQLSTSEENSK	2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSSEESIISQETYK	4 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NAVPIPTLNRQLSTSEENSK	3 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSSEESIISQETYK	5 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NANEEYSIGSSSEESAEVATEEVK	4 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NANEEYSIGSSSEESAEVATEEVK	6 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	QNTLPSK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	TSQLTDHSK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	LDLDHKSEEDK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	HSNLIESQENSK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	ISHELDSASSEVN	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	HSNLIESQENSK	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	ISHELDSASSEVN	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	ISHELDSASSEVN	3 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	ETNSSELSKELTPK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	ETNSSELSKELTPK	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	IRISHELDSASSEVN	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	NKHSNLIESQENSK	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	IRISHELDSASSEVN	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	TSQLTDHSKETNSSELSK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	TSQLTDHSKETNSSELSK	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	QTFLAPQNSVSSEETDDNK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	QTFLAPQNSVSSEETDDNK	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	KTSQLTDHSKETNSSELSK	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	QTFLAPQNSVSSEETDDNK	3 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	HSNLIESQENSKLSQEFHSLEDK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	SNVQSPDATEEDFTSHIESEEMHDAPK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	SNVQSPDATEEDFTSHIESEEMHDAPK	2 Phospho (ST)

OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	QNTLPSK	Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	LDLDHKSEEDK	Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	HSNLIESQENSK	Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	ISHELDSASSEVN	Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	HSNLIESQENSK	2 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	ISHELDSASSEVN	2 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	ISHELDSASSEVN	3 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	IRISHELDSASSEVN	Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	NKHSNLIESQENSK	2 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	IRISHELDSASSEVN	2 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	QTFLAPQNSVSSEETDDNK	Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	QTFLAPQNSVSSEETDDNK	2 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	QTFLAPQNSVSSEETDDNK	3 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	HSNLIESQENSKLSQEFHSLEDK	Phospho (ST)
Q58DM6_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=2 SV=1	QNTLPSK	Phospho (ST)
Q58DM6_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=2 SV=1	QTFLAPQNSVSSEETDDNK	Phospho (ST)
Q58DM6_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=2 SV=1	QTFLAPQNSVSSEETDDNK	2 Phospho (ST)
Q58DM6_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=2 SV=1	QTFLAPQNSVSSEETDDNK	3 Phospho (ST)
B6V315_BOVIN Alpha-lactalbumin OS=Bos taurus GN=LALBA PE=1 SV=1	DDQNPQHSSNICNISCDK	Phospho (ST)
PERL_BOVIN Lactoperoxidase OS=Bos taurus GN=LPO PE=1 SV=1	TTLSEAPTQQQLSEYFK	Phospho (ST)
A5PJE3_BOVIN Fibrinogen alpha chain OS=Bos taurus GN=FGA PE=1 S	MEDEAESLEDLGFK	Phospho (ST)
F1MDT6_BOVIN Glycerol-3-phosphate acyltransferase 1, mitochondr	SDEEDEDSDFGEEQR	Phospho (ST)
F6PZ29_BOVIN Uncharacterized protein OS=Bos taurus GN=MCFD2 PE=	EEGSEQAPMNEDELINLIDGVLR	Phospho (ST)
F6PZ29_BOVIN Uncharacterized protein OS=Bos taurus GN=MCFD2 PE=	EEGSEQAPMNEDELINLIDGVLR	Oxidation (M); Phospho (ST)
B0JYN6_BOVIN Alpha-2-HS-glycoprotein OS=Bos taurus GN=AHSG PE=1	CDSSPDSAEDVR	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	EPSISR	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	EDLISK	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSK	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSK	2 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	EPSISREDLISK	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	EDLISKEQIVIR	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	EPSISREDLISK	2 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	EPSISREDLISK	3 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISR	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISR	2 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISR	3 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISR	4 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISREDLISK	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISREDLISK	3 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISREDLISK	4 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISREDLISK	5 Phospho (ST)
E1BHI7_BOVIN Butyrophilin subfamily 1 member A1 OS=Bos taurus G	VSPAVFVSR	Phospho (ST)

F1MXX6_BOVIN Lactadherin OS=Bos taurus GN=MFGE8 PE=1 SV=1	AGSAEYLK	Phospho (ST)
C6KEF7_BOVIN Growth/differentiation factor 8 OS=Bos taurus GN=M	DASSDGSLEDDDYHAR	Phospho (ST)
F1MRM8_BOVIN G-protein-coupled receptor family C group 5 member	ATANSQVTGSANSTLR	2 Phospho (ST)
F1MHI1_BOVIN Perilipin OS=Bos taurus GN=PLIN2 PE=3 SV=1	LGSLSTK	Phospho (ST)
Q3SX32_BOVIN Perilipin OS=Bos taurus GN=M6PRBP1 PE=2 SV=1	LGLSER	Phospho (ST)
E1BPQ9_BOVIN Uncharacterized protein OS=Bos taurus GN=IGSF5 PE=	SANENYGYHSDESR	Phospho (ST)
F1MX65_BOVIN Protein OS-9 OS=Bos taurus GN=OS9 PE=1 SV=1	KPPSPQSTEEDPEHR	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	EKVNELSK	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	KYKVPQLEIVPNSAEER	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	QMEAESISSSEEIVPNSVEQK	Oxidation (M); 5 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	EKVNELSKDIGESTEDQAMEDIK	Oxidation (M); 3 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NAVPIPTLNR	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSEESIISQETYK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NANEEEYSIGSSSEESAEVATEEVK	4 Phospho (ST); Phospho (Y)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	IRISHELDSASSEVN	3 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	SNVQSPDATEEDFTSHIESEEMHDAPK	Oxidation (M); 2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	RSNVQSPDATEEDFTSHIESEEMHDAPK	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	RSNVQSPDATEEDFTSHIESEEMHDAPK	3 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	IRISHELDSASSEVN	3 Phospho (ST)
TRY1_BOVIN Cationic trypsin OS=Bos taurus PE=1 SV=3	SSGTSYPDVVK	Phospho (Y)
F1MVT9_BOVIN Uncharacterized protein OS=Bos taurus GN=SPOCK1 PE	VINPTSSETAQGR	Phospho (ST)
SEP15_BOVIN 15 kDa selenoprotein OS=Bos taurus GN=SEP15 PE=2 SV	WNTDSVEEFLSEK	Phospho (ST)
NUCB1_BOVIN Nucleobindin-1 OS=Bos taurus GN=NUCB1 PE=2 SV=1	LSQETEALGR	Phospho (ST)
NUCB1_BOVIN Nucleobindin-1 OS=Bos taurus GN=NUCB1 PE=2 SV=1	AQRLSQETEALGR	Phospho (ST)
B0JYN6_BOVIN Alpha-2-HS-glycoprotein OS=Bos taurus GN=AHSG PE=1	CDSSPDSAEDVRK	Phospho (ST)
SIL1_BOVIN Nucleotide exchange factor SIL1 OS=Bos taurus GN=SIL	KETEELEPK	Phospho (ST)
SIL1_BOVIN Nucleotide exchange factor SIL1 OS=Bos taurus GN=SIL	EGAEMENSKEDQER	Phospho (ST)
SIL1_BOVIN Nucleotide exchange factor SIL1 OS=Bos taurus GN=SIL	EGAEMENSKEDQER	Oxidation (M); Phospho (ST)
PIGR_BOVIN Polymeric immunoglobulin receptor OS=Bos taurus GN=P	SPIFGPEEVTSVEGR	Phospho (ST)
F1MHI1_BOVIN Perilipin OS=Bos taurus GN=PLIN2 PE=3 SV=1	KDQYPYLK	Phospho (Y)
A0A140T8A9_BOVIN Kappa-casein OS=Bos taurus GN=CSN3 PE=1 SV=1	SCQAQPTTMAR	Oxidation (M); Phospho (ST)
HS90A_BOVIN Heat shock protein HSP 90-alpha OS=Bos taurus GN=HS	ESDDKPEIEDVGSDEEEEEKK	Phospho (ST)
A0A140T8C8_BOVIN Kininogen-1 OS=Bos taurus GN=KNG1 PE=1 SV=1	ETTCSKGSNEELTK	Phospho (ST)
RAN_BOVIN GTP-binding nuclear protein Ran OS=Bos taurus GN=RAN	LVLVGDGGTGK	Phospho (ST)
B5UBG1_BOVIN Calcitonin OS=Bos taurus GN=CT PE=2 SV=1	DVANSLER	Phospho (ST)
F1N5I2_BOVIN Uncharacterized protein OS=Bos taurus GN=DLGAP4 PE	AMGDEDSDESGGSPKPSPK	Phospho (ST)
F1N5I2_BOVIN Uncharacterized protein OS=Bos taurus GN=DLGAP4 PE	AMGDEDSDESGGSPKPSPK	2 Phospho (ST)
E1BF27_BOVIN Uncharacterized protein OS=Bos taurus GN=SLC38A10	MPGSPEQHGAGDVPQSR	Phospho (ST)
B4GT1_BOVIN Beta-1,4-galactosyltransferase 1 OS=Bos taurus GN=B	LPQLVGVHPLQGSSSHGAAAIGQPSGEL	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	DIGESTEDQAMEDIK	Oxidation (M); 3 Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	ELEELNVPGEIVESLSSEESITR	5 Phospho (ST)
TRY1_BOVIN Cationic trypsin OS=Bos taurus PE=1 SV=3	APILSDSSCK	Phospho (ST)

CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	ENLCSTFCK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NMAINPSKENLCSTFCK	2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSEESIISQETYK	3 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSEESIISQETYK	3 Phospho (ST); Phospho (Y)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSEESIISQETYK	Oxidation (M); 4 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NANEEEEYSIGSSSEESAEEVATEEVK	3 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NANEEEEYSIGSSSEESAEEVATEEVK	5 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	KTSQLTDHSK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	LSQEFHSLEDK	Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	LSQEFHSLEDK	Phospho (ST)
BT1A1_BOVIN Butyrophilin subfamily 1 member A1 OS=Bos taurus GN	VSPAVFVSR	Phospho (ST)
BT1A1_BOVIN Butyrophilin subfamily 1 member A1 OS=Bos taurus GN	EIPLSPMGEDSASGDIETLHSK	2 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NATLGSEETTEHTPSDASTTEGK	Phospho (ST)
CO3_BOVIN Complement C3 OS=Bos taurus GN=C3 PE=1 SV=2	EEVPAADLSDQVPDTESETK	Phospho (ST)
F1MMF7_BOVIN Uncharacterized protein OS=Bos taurus GN=C17orf80	MLKDTKPKVASR	Phospho (ST)
F1MJQ4_BOVIN Uncharacterized protein OS=Bos taurus GN=P4HA2 PE=	GQEFLRPCGSTVEVD	Phospho (ST)
F1MNT4_BOVIN Uncharacterized protein OS=Bos taurus GN=LAMB1 PE=	NFLTQDSADLDSIEAVANEVLK	2 Phospho (ST)
F1N2Y2_BOVIN Uncharacterized protein OS=Bos taurus GN=COL5A2 PE	GPVGSSEPKGGQGDPRPGEPGLPGAR	2 Phospho (ST)
E1BIT6_BOVIN Uncharacterized protein OS=Bos taurus GN=ALOXE3 PE	MALYRVRVTTGPYLMAGTLDNIFVTLVG	Oxidation (M); 4 Phospho (ST)

Table S2. Detail information of phosphoproteins and phosphopeptides enriched from tryptic digest of milk using commercial TiO₂.

Phosphoprotein	Phosphopeptide	Modification
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	VNELSK	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	YLGYLEQLLR	Phospho (Y)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	VPQLEIVPNSAEER	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	DIGSESTEDQAMEDIK	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	DIGSESTEDQAMEDIK	Oxidation (M); Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	DIGSESTEDQAMEDIK	2 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	DIGSESTEDQAMEDIK	Oxidation (M); 2 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	YKVPQLEIVPNSAEER	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	DIGSESTEDQAMEDIK	3 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	YKVPQLEIVPNSAEER	Phospho (ST); Phospho (Y)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	VNELSKDIGSESTEDQAMEDIK	2 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	VNELSKDIGSESTEDQAMEDIK	Oxidation (M); 2 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	QMEAESISSSEEIVPNSVEQK	4 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	QMEAESISSSEEIVPNSVEQK	Oxidation (M); 4 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	VNELSKDIGSESTEDQAMEDIK	3 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	VNELSKDIGSESTEDQAMEDIK	Oxidation (M); 3 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	QMEAESISSSEEIVPNSVEQK	5 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	VNELSKDIGSESTEDQAMEDIK	4 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	EKVNELSKDIGSESTEDQAMEDIK	2 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	EKVNELSKDIGSESTEDQAMEDIK	3 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	QMEAESISSSEEIVPNSVEQKHIQK	5 Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	FQSEEQQTDELDQK	Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	FQSEEQQTDELDQK	2 Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	IEKFQSEEQQTDELDQK	Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	KIEKFQSEEQQTDELDQK	Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	ELEELNVPGEIVESLSSEESITR	Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	ELEELNVPGEIVESLSSEESITR	2 Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	ELEELNVPGEIVESLSSEESITR	3 Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	ELEELNVPGEIVESLSSEESITR	4 Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	ELEELNVPGEIVESLSSEESITRINK	4 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NMAINPSK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NMAINPSK	Oxidation (M); Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	TKLTEEEK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	EQLSTSEENSK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	EQLSTSEENSK	2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	EQLSTSEENSKK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	TVDMESTEVFTK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	TVDMESTEVFTK	Oxidation (M); Phospho (ST)

CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	EQLSTSEENSK	3 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	EQLSTSEENSKK	2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	TVDMESTEVFTK	2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	TVDMESTEVFTK	Oxidation (M); 2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	KTVDMESTEVEFTK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	TVDMESTEVFTKK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	KTVDMESTEVEFTK	Oxidation (M); Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	TVDMESTEVFTKK	Oxidation (M); Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	EQLSTSEENSKK	3 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	KTVDMESTEVEFTK	2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	KTVDMESTEVEFTK	Oxidation (M); 2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NMAINPSKENLCSTFCK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NMAINPSKENLCSTFCK	Oxidation (M); Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSSEESIISQETYK	2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSSEESIISQETYK	Oxidation (M); 3 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NAVPIPTLNREQLSTSEENSK	2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSSEESIISQETYK	4 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NAVPIPTLNREQLSTSEENSK	3 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSSEESIISQETYK	5 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NANEEYSIGSSSEESAEVATEEVK	4 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NANEEYSIGSSSEESAEVATEEVK	6 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	QNTLPSK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	TSQLTDHSHK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	LDLDHKSEEDK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	HSNLIQSQENSK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	ISHELDSASSEVN	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	HSNLIQSQENSK	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	ISHELDSASSEVN	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	ISHELDSASSEVN	3 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	ETNSSELSKELTPK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	ETNSSELSKELTPK	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	IRISHELDSASSEVN	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	NKHSNLIQSQENSK	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	IRISHELDSASSEVN	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	TSQLTDHSHKETNSSELSK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	TSQLTDHSHKETNSSELSK	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	QTFLAPQNSVSSEETDDNK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	QTFLAPQNSVSSEETDDNK	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	KTSQLTDHSHKETNSSELSK	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	QTFLAPQNSVSSEETDDNK	3 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	HSNLIQSQENSKLSQEFHSLLEDK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	SNVQSPDATEEDFTSHIESEEMHDAPK	Phospho (ST)

F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	SNVQSPDATEEDFTSHIESEEMHDAPK	2 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	QNTLPSK	Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	LDLDHKSEEDK	Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	HSNLIESQENSK	Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	ISHELDSASSEVN	Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	HSNLIESQENSK	2 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	ISHELDSASSEVN	2 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	ISHELDSASSEVN	3 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	IRISHELDSASSEVN	Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	NKHSNLIESQENSK	2 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	IRISHELDSASSEVN	2 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	QTFLAPQNSVSSEETDDNK	Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	QTFLAPQNSVSSEETDDNK	2 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	QTFLAPQNSVSSEETDDNK	3 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	HSNLIESQENSKLSQEFHSLEDK	Phospho (ST)
Q58DM6_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=2 SV=1	QNTLPSK	Phospho (ST)
Q58DM6_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=2 SV=1	QTFLAPQNSVSSEETDDNK	Phospho (ST)
Q58DM6_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=2 SV=1	QTFLAPQNSVSSEETDDNK	2 Phospho (ST)
Q58DM6_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=2 SV=1	QTFLAPQNSVSSEETDDNK	3 Phospho (ST)
B6V3I5_BOVIN Alpha-lactalbumin OS=Bos taurus GN=LALBA PE=1 SV=1	DDQNPHSSNICNISCDK	Phospho (ST)
PERL_BOVIN Lactoperoxidase OS=Bos taurus GN=LPO PE=1 SV=1	TTLSEAPTTQQLSEYFK	Phospho (ST)
A5PJE3_BOVIN Fibrinogen alpha chain OS=Bos taurus GN=FGA PE=1 S	MEDEAESLEDLGFK	Phospho (ST)
F1MDT6_BOVIN Glycerol-3-phosphate acyltransferase 1, mitochondr	SDEEDEDSDFGEEQR	Phospho (ST)
F6PZ29_BOVIN Uncharacterized protein OS=Bos taurus GN=MCFD2 PE=	EEGSEQAPMNEDELINLIDGVLR	Phospho (ST)
F6PZ29_BOVIN Uncharacterized protein OS=Bos taurus GN=MCFD2 PE=	EEGSEQAPMNEDELINLIDGVLR	Oxidation (M); Phospho (ST)
BOJYN6_BOVIN Alpha-2-HS-glycoprotein OS=Bos taurus GN=AHSG PE=1	CDSSPDSAEDVR	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	EPSISR	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	EDLISK	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSK	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSK	2 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	EPSISREDLISK	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	EDLISKEQIVIR	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	EPSISREDLISK	2 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	EPSISREDLISK	3 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISR	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISR	2 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISR	3 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISR	4 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISREDLISK	Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISREDLISK	3 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISREDLISK	4 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NLQISNEDLSKEPSISREDLISK	5 Phospho (ST)

E1BHI7_BOVIN Butyrophilin subfamily 1 member A1 OS=Bos taurus G	VSPAVFVSR	Phospho (ST)
F1MXX6_BOVIN Lactadherin OS=Bos taurus GN=MFG8 PE=1 SV=1	AGSAEYLK	Phospho (ST)
C6KEF7_BOVIN Growth/differentiation factor 8 OS=Bos taurus GN=M	DASSDGSLEDDDYHAR	Phospho (ST)
F1MRM8_BOVIN G-protein-coupled receptor family C group 5 member	ATANSQVTGSANSTLR	2 Phospho (ST)
F1MHI1_BOVIN Perilipin OS=Bos taurus GN=PLIN2 PE=3 SV=1	LGSLSTK	Phospho (ST)
Q3SX32_BOVIN Perilipin OS=Bos taurus GN=M6PRBP1 PE=2 SV=1	LGSLSER	Phospho (ST)
E1BPQ9_BOVIN Uncharacterized protein OS=Bos taurus GN=IGSF5 PE=	SANENYGYHSDESR	Phospho (ST)
F1MX65_BOVIN Protein OS-9 OS=Bos taurus GN=OS9 PE=1 SV=1	KPPSPQSTEEDPEHR	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	EKVNELSK	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	KYKVPQLEIVPNSAEER	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	QMEAESISSSEIIVPNSVEQK	Oxidation (M); 5 Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	EKVNELSKDIGESTEDQAMEDIK	Oxidation (M); 3 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NAVPIPTLNR	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSSEIISQETYK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NANEEEYSIGSSSEESAEEVATEEVK	4 Phospho (ST); Phospho (Y)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	IRISHELDSASSEVN	3 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	SNVQSPDATEEDFTSHIESEEMHDAPK	Oxidation (M); 2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	RSNVQSPDATEEDFTSHIESEEMHDAP	2 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	RSNVQSPDATEEDFTSHIESEEMHDAP	3 Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	IRISHELDSASSEVN	3 Phospho (ST)
TRY1_BOVIN Cationic trypsin OS=Bos taurus PE=1 SV=3	SSGTSYPDVLK	Phospho (Y)
F1MVT9_BOVIN Uncharacterized protein OS=Bos taurus GN=SPOCK1 PE	VINPTSSETAQGR	Phospho (ST)
SEP15_BOVIN 15 kDa selenoprotein OS=Bos taurus GN=SEP15 PE=2 SV	WNTDSVEEFLSEK	Phospho (ST)
NUCB1_BOVIN Nucleobindin-1 OS=Bos taurus GN=NUCB1 PE=2 SV=1	LSQETEALGR	Phospho (ST)
NUCB1_BOVIN Nucleobindin-1 OS=Bos taurus GN=NUCB1 PE=2 SV=1	AQRLSQETEALGR	Phospho (ST)
BOJYN6_BOVIN Alpha-2-HS-glycoprotein OS=Bos taurus GN=AHSG PE=1	CDSSPDSAEDVRK	Phospho (ST)
SIL1_BOVIN Nucleotide exchange factor SIL1 OS=Bos taurus GN=SIL	KETEEELEPK	Phospho (ST)
SIL1_BOVIN Nucleotide exchange factor SIL1 OS=Bos taurus GN=SIL	EGAEMENSKEDQER	Phospho (ST)
SIL1_BOVIN Nucleotide exchange factor SIL1 OS=Bos taurus GN=SIL	EGAEMENSKEDQER	Oxidation (M); Phospho (ST)
PIGR_BOVIN Polymeric immunoglobulin receptor OS=Bos taurus GN=P	SPIFGPEEVTVEGR	Phospho (ST)
F1MHI1_BOVIN Perilipin OS=Bos taurus GN=PLIN2 PE=3 SV=1	KDQYPYLK	Phospho (Y)
A0A140T8A9_BOVIN Kappa-casein OS=Bos taurus GN=CSN3 PE=1 SV=1	SCQAQPTTMAR	Oxidation (M); Phospho (ST)
HS90A_BOVIN Heat shock protein HSP 90-alpha OS=Bos taurus GN=HS	ESDDKPEIEDVGSDEEEEEK	Phospho (ST)
A0A140T8C8_BOVIN Kininogen-1 OS=Bos taurus GN=KNG1 PE=1 SV=1	ETTCCKGSNEELTK	Phospho (ST)
RAN_BOVIN GTP-binding nuclear protein Ran OS=Bos taurus GN=RAN	LVLVGDGGTGK	Phospho (ST)
B5UBG1_BOVIN Calcitonin OS=Bos taurus GN=CT PE=2 SV=1	DVANSLER	Phospho (ST)
F1N5I2_BOVIN Uncharacterized protein OS=Bos taurus GN=DLGAP4 PE	AMGDEDSDESGGSPKPSPK	Phospho (ST)
F1N5I2_BOVIN Uncharacterized protein OS=Bos taurus GN=DLGAP4 PE	AMGDEDSDESGGSPKPSPK	2 Phospho (ST)
E1BF27_BOVIN Uncharacterized protein OS=Bos taurus GN=SLC38A10	MPGSPEQHGAGDVPQSR	Phospho (ST)
B4GT1_BOVIN Beta-1,4-galactosyltransferase 1 OS=Bos taurus GN=B	LPQLVGVHPPLQGSSHGAAAIGQPSGE	Phospho (ST)
CASA1_BOVIN Alpha-S1-casein OS=Bos taurus GN=CSN1S1 PE=1 SV=2	DIGSESTEDQAMEDIK	Oxidation (M); 3 Phospho (ST)
CASB_BOVIN Beta-casein OS=Bos taurus GN=CSN2 PE=1 SV=2	ELEELNVPGEIVESLSSEESITR	5 Phospho (ST)

TRY1_BOVIN Cationic trypsin OS=Bos taurus PE=1 SV=3	APILSDSSCK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	ENLCSTFCK	Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NMAINPSKENLCSTFCK	2 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSSEESIISQETYSK	3 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSSEESIISQETYSK	3 Phospho (ST); Phospho (Y)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NTMEHVSSSEESIISQETYSK	Oxidation (M); 4 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NANEEEEYSIGSSSEESAEEVATEEVK	3 Phospho (ST)
CASA2_BOVIN Alpha-S2-casein OS=Bos taurus GN=CSN1S2 PE=1 SV=2	NANEEEEYSIGSSSEESAEEVATEEVK	5 Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	KTSQLTDHSK	Phospho (ST)
F1MI46_BOVIN Osteopontin OS=Bos taurus GN=SPP1 PE=1 SV=1	LSQEFHSLEDK	Phospho (ST)
OSTK_BOVIN Osteopontin-K OS=Bos taurus PE=2 SV=1	LSQEFHSLEDK	Phospho (ST)
BT1A1_BOVIN Butyrophilin subfamily 1 member A1 OS=Bos taurus GN	VSPAVFVSR	Phospho (ST)
BT1A1_BOVIN Butyrophilin subfamily 1 member A1 OS=Bos taurus GN	EIPLSPMGEDSASGDIETLHSK	2 Phospho (ST)
GLCM1_BOVIN Glycosylation-dependent cell adhesion molecule 1 OS	NATLGSEETTEHTPSDASTTEGK	Phospho (ST)
CO3_BOVIN Complement C3 OS=Bos taurus GN=C3 PE=1 SV=2	EEVPAADLSDQVPDTESETK	Phospho (ST)
F1MMF7_BOVIN Uncharacterized protein OS=Bos taurus GN=C17orf80	MLKDTPKPKVASR	Phospho (ST)
F1MJQ4_BOVIN Uncharacterized protein OS=Bos taurus GN=P4HA2 PE=	GQEFRLPCGSTEVD	Phospho (ST)
F1MNT4_BOVIN Uncharacterized protein OS=Bos taurus GN=LAMB1 PE=	NFLTQDSADLDSIEAVANEVLK	2 Phospho (ST)
F1N2Y2_BOVIN Uncharacterized protein OS=Bos taurus GN=COL5A2 PE	GPVGSSEPKGGQGDPRGPEGLPGAR	2 Phospho (ST)
E1BIT6_BOVIN Uncharacterized protein OS=Bos taurus GN=ALOXE3 PE	MALYRVRVTTGPYLMAGTLDNIFVTLV	Oxidation (M); 4 Phospho (ST)